

WBS 3.0, C-0 Outfitting **Portion of the** **BTeV Project**

This document contains the Advanced Conceptual Design Report, Project Execution Plan for WBS 3.0, and related reference material.



Fermilab

FESS/Engineering Project No. 6-8-3

Rev. 0

C-0 Outfitting
WBS 3.0
BTeV Project
Advanced Conceptual Design Report
April 2004

Fermilab



Fermi National Accelerator Laboratory
A Department of Energy National Laboratory
Managed by Universities Research Association

FESS/Engineering Project No. 6-8-3
Rev. 0

This Advanced Conceptual Design Report (CDR) is intended to be a self-consistent basis for a project baseline cost estimate. It is not a Title 1 report and has not answered every technical design question. The current level of contingency is believed to be consistent with the degree of technical confidence in the design at this stage. It is recognized that some basic construction concerns will be reviewed and optimized during the remaining stages of the project.

This Advanced Conceptual Design Report is meant to augment the project's Conceptual Design Report by providing more in depth levels of detail.

SECTION I	EXECUTIVE SUMMARY
SECTION II	DETAILED DESCRIPTION
SECTION III	PERFORMANCE REQUIREMENTS
SECTION IV	REQUIREMENTS AND ASSESSMENTS
PART 1	Safeguards and Security
PART 2	Energy Conservation
PART 3	Health and Safety
PART 4	Environmental Protection
PART 5	Decontamination and Decommissioning
PART 6	Quality Assurance
PART 7	Maintenance and Operation
PART 8	Telecommunications
PART 9	Computer Equipment
PART 10	Handicapped Provisions
PART 11	Emergency Shelter Provisions
SECTION V	APPLICABLE CODES, STANDARDS AND QUALITY LEVELS
	BUILDING CODE EXAMINATION
	LEED ANALYSIS
SECTION VI	COST ESTIMATE DETAIL
SECTION VII	SCHEDULE DETAILS
SECTION VII	I CONCEPTUAL DRAWINGS
APPENDIX	
	Fermilab Environmental Evaluation Form
	Fermilab Engineering Standards Manual (not Included for this review)
	Applicable Directives and Work Smart Standards (not Included for this review)
	LEED Project Checklist
	Whitestone Building and Repair Cost Reference Information
	Stakeholder Input from Comment and Compliance Review

EXECUTIVE SUMMARY

C-0 Outfitting

Section I

This section of the Advanced Conceptual Design Report (CDR) defines the scope, cost and schedule for WBS 3.0, C-0 Outfitting portion of the BTeV project. The BTeV experiment will reside in the C-0 Building located at the C-0 station of the Tevatron Accelerator. This sub-project provides the required services and spatial configuration required to support the BTeV experiment. In addition this subproject provides for the building modification and electrical upgrades to the B-4, C-0 and C-1 Main Ring Service Buildings that are required to support the Interaction Region (IR) components.

Three main construction work packages are anticipated:

C-0 Outfitting Phase 1, installs the mezzanine structures, concrete masonry walls, fire protection, fire detection and electrical services needed to construct and test the magnet and torroids in the Assembly area.

C-0 Outfitting Phase 2, installs the heating ventilation air conditioning (HVAC), process piping systems, and power required to support the BTeV detector electronics.

C-0 Sector High Voltage Power upgrade installs the 13.8 kv power required for full operation of the C-0 Building and for the IR at C-0.

PROJECT COSTS

The Total Estimated Cost (TEC) for WBS 3.0, C-0 Outfitting, is estimated to be \$7,213,157.

		No Escalation	Full material Procurement 'Burdening'				
Activity ID	Activity Description	Material & Services Cost	Labor Cost	Base Budget	Labor Contingency (\$)	Materials & Services Contingency (\$)	Total Budget (Base + Contingency)
CONSTRUCTION							
		\$4,896,576	\$1,084,177	\$5,980,754	\$216,835	\$1,015,567	\$7,213,157
1 -- C-0 Outfitting Phase 1							
		\$1,812,958	\$426,288	\$2,239,246	\$85,257	\$362,591	\$2,687,095
2 -- C-0 Outfitting Phase 2							
		\$1,859,031	\$444,071	\$2,303,102	\$88,814	\$408,058	\$2,799,975
3 -- C Sector High Voltage Power Upgrade							
		\$599,249	\$175,470	\$774,720	\$35,094	\$119,849	\$929,664
4 -- Pre Procured Items							
		\$625,337	\$38,347	\$663,684	\$7,669	\$125,067	\$796,421

EXECUTIVE SUMMARY**C-0 Outfitting****Section
I**

The TEC includes Construction, EDIA (Engineering, Design, Inspection and Administration). Management Reserve and Indirect Costs, although included in the above dollars, will be held in Project Management. The TEC have been estimated in FY05 dollars. No escalation has been included.

Section VI, Cost Estimate Detail, of this document contains breakdown of the TEC for WBS 3.0 C-0 Outfitting. Additional details can be found in the Open Plan file.

SCHEDULE

Section VII, Schedule Details includes a print out of the Open Plan detailed bar chart for WBS 3.0 C-0 Outfitting. Additional schedule information can be found in the Open Plan file. The following is a list of the major milestones included in WBS 3.0.

Activity ID	Activity Description	Activity	Finish
3.5.1	Lev2Mil: MS-1 Start Engineering		01Oct04
3.5.2	Lev1Mil: MS-2 Start Construction		28Jan05
3.5.3	Lev3Mil: MS-3 Side Bay. Struct. Complete		26Oct05
3.5.4	Lev3Mil: MS-4 Temp. Power Operational (Fdr 45)		15Nov05
3.5.5	Lev1Mil: MS-5 Beneficial Occupancy of lower level And upper staging area		17Jan06
3.5.6	Lev1Mil: MS-6 Collision Hall Complete		07Sept07
3.5.7	Lev3Mil: MS-7 MECH Systems Complete (Ex.CH)		21Aug07
3.5.8	Lev3Mil: MS-8 Electrical Systems Complete		16Aug07
3.5.9	Lev1MIL: MS-9 Assembly, Service Building Construction Complete		07Sept07
3.5.10	Lev2Mil: MS-10 Engineering Complete		12Nov07

DETAILED DESCRIPTION**C-0 Outfitting****Existing Conditions****C-0 Test Area**

In 1998 Fermilab started construction of the C-0 Test Area at the C-0 straight of the Tevatron Accelerator. The layout for the C-0 Collision Hall Area is similar to the D-0 colliding beam facility. The current C-0 Building is a weather tight building shell with overall dimensions of 78' x 60' wide x 26' above grade. An 80' long x 30' wide x 22'-6" high Collision Hall lies on the Tevatron Beam line. An equipment by-pass extends around the Collision Hall at El. 722'-6 to provide continuity of the service aisle that is adjacent to the Tevatron beam line components. The Tevatron Enclosure approaches to the Collision Hall were constructed wider than the standard Main Ring enclosure with a depressed floor at El. 720'-0 to accept the Low Beta components. The Collision Hall, By-Pass and approach enclosures were constructed with the lighting, electrical services, cable trays and process piping to support the Tevatron Beam line components. The Collision Hall also included sprinkler piping to be connected to the ICW system included in the current C-0 Outfitting Phase 1 Work package.

The Collision Hall is connected to the Assembly Area via a movable shield door and personnel labyrinth. The central region under crane coverage is 33' wide x 50' long with alcoves of varying depth along the south and east perimeter. The Assembly Area and adjacent Receiving Area have been constructed with an overhead 30-ton crane, high bay lighting, spot smoke detection and fire suppression piping. A side bay 25' wide x 75' long has been construction with the columns designed to support two additional mezzanine floor decks. Stairs, elevators, electrical and mechanical rooms were considered in the original design.

C-0 Service Building

The C-0 Service Building is located on the inside of the Tevatron berm. A portion of the building is used to house a compressor for the Tevatron cryogenics. The B-4, C-1, and C-0 Service Buildings contained power supplies for the Main Ring. With the construction of the Main Injector these power supplies are no longer required and allow for the space to be reused for supplies that are required for the IR. See the detailed descriptions provided in WBS 2.0 Interaction Region Advanced Conceptual Design.

DETAILED DESCRIPTION**C-0 Outfitting****Section
II****Proposed Site work**

The C-0 Outfitting site work involves upgrades of the existing C-0 Building constructed in 1998 and will install the power and mechanical services required to support the BTeV project. Upgrades to the site area includes the construction of mechanical equipment and Dewar support pads, a shed type building for gas bottles, underground utility work for and a new 13.8 KV feeder duct bank from the existing manhole at the B-4 Service Building to a new transformer pad at the C-0 Building. The transformer pad will contain three new 1500 KVA transformers, 13.8 kv switchgear and a 250 KVA Diesel Generator. Included in the site electrical work will be the construction of a new bus duct enclosure from the C-0 Service Building to the Collision Hall. Also included is the installation of a new 1500 KVA transformer at the C-0 Service building and new 500 KVA transformers at service buildings B-4 and C-1.

Architectural

The architectural build out portion of this project consists primarily of the installation of walls, doors, finishes, stairs, elevator, and raised computer flooring. Once the concrete floors have been installed to provide new floor levels at elevations 755'-4" and 764'-2", concrete block walls will be constructed between the high bay area and each of the newly installed floor sections on the north side of the building. Two of the 3 floors will have windows installed between the newly occupied space and the existing high bay. These windows will allow in daylight from the existing high bay skylights to enter the new areas, thereby enhancing the quality of the spaces, and allowing occupants to view the activities below.

Concrete block walls and hollow metal doors will be installed to enclose the equipment room, the elevator shaft, the stairway, the toilet rooms and janitor closets, as well as the mechanical and equipment rooms at elevations 731'-4" and 715'-0". An elevator will be installed in the existing previously planned shaft space. The elevator will be a 5,000-pound capacity "hospital" type elevator with openings on either end as required to accommodate the floor plan, with a total of 5 stops. Slight modifications will be made to the roof above the elevator shaft, raising it to a height that will provide the required head clearance for the elevator access to the third floor. An enclosed stair will be construction on the north side of the building, to provide the code required second means of egress for the first, second and third floors. It will consist of steel framing with siding and roofing to match the existing building. The current stairways provide the required exits from below grade spaces.

DETAILED DESCRIPTION**C-0 Outfitting****Section
II**

The entrance level (first floor) of the building (elev 746'-6") will have a raised computer floor system installed over the already constructed depressed floor. Also constructed on this floor will be the interior stairs, the stair enclosure and the wall for the electrical equipment room and elevator enclosure, as well as the wall separating this floor from the high bay. Similar to the first floor, the second floor of the building (elev 755'-4") will see the construction of the interior stairs, the stair enclosure walls, and the wall closing off this floor from the high bay. In addition, this floor will house the new single user men's and women's toilet rooms, the janitor closet and a small kitchenette to service the building occupants. The third floor (elev 766'-0") will have a raised computer floor system installed over the newly installed concrete floor construction. Constructed on this floor will be the interior stairs, the stair enclosure wall, the elevator enclosure walls, and the wall separating this floor from the high bay.

Finishes

The wall finishes will consist of painted concrete block for the new block walls. The ceiling finish will consist of the exposed underside of the concrete deck, painted with a textured, acoustical material to improve the acoustical qualities of the room. The interior liner panel of the exterior siding will provide wall finishes along the exterior walls. The second floor will have carpeting. The first and third floor computer rooms will have stringer type computer flooring. The computer floors will be isolated to building ground and have a separate under floor ground grid tied to the primary transformer grounding loop. The toilet rooms, janitor closet and kitchenette will have ceramic tile floors. All other areas (corridors, stairs, mechanical and equipment rooms) will have sealed exposed concrete floors.

Structural

The new floor levels at elevations 755'-4" and 764'-2" will be eight-inch thick post tensioned, prestressed concrete floor slabs that have been selected to provide a minimum floor thickness. The slab will simply span between steel beams framed into the existing steel columns. Final design will evaluate cost and construction benefits of the precast slab system vs. a cast-in-place post tension flat plate floor system.

Conventional Mechanical (HVAC)

The 3rd floor will be outfitted with 4 (CRAC) Computer Room Air Handlers to handle approximately 342 KW to 350 KW heat load from high density computer racks, or

DETAILED DESCRIPTION**C-0 Outfitting****Section
II**

44 computer racks with heat density of approximately 7.8 to 7.9 KW per rack. Each CRAC will be discharging approximately 52 to 56 F supply air into a common under floor supply plenum. There will be no spare or backup CRAC unit. Each unit will have leak detection sensor. All unit and leak sensors will tie in to a central monitoring panel. The CRAC humidifier system will be plumbed to domestic water to maintain the 45% + 5 RH at all times. Each CRAC will have corresponding outdoor air-cooled condenser with R22 refrigerant. The raised floor air distribution system plenum height is tentatively set at 1'-10", and may be optimized during design stage. The layout of the racks will utilize the "hot-aisle cold-aisle" concept commonly used in present day high-density data center. Due to lack of ceiling height, there will be no common return plenum. The rack dimension given is based on Wide Band HDCF Project at 3 ft x 2 ft x 6.5 ft height. The placement of this equipment in relation to the CRAC is very critical in ensuring optimum air distribution therefore the floor layout may be altered during design stage. The space condition is at 72 F dry bulb and 45%RH, and designed with no occupant heat load during standard operation. The space to be occupied by the under floor cabling is not yet defined but based on preliminary information it is noted that it will occupy minimal space and is assumed to be no more than 20% of the under floor space. The air supply floor grille will be selected to have higher throw, more free area and less pressure drop to optimize the air distribution.

The 2nd floor office area will be served by a dedicated air-handling unit (AHU) with chilled water coil and electric heating coil. The unit will be located in the mechanical room. Air from AHU (estimated at 5 ton) will be distributed to this area via an insulated ductwork system to be routed to the office area through the pipe/duct chase. This unit will utilize an economizer cycle to cool the space when outdoor air temperatures are appropriate. Minimum outdoor air for 25 persons will be included in the air handling unit design. The space condition is for a typical office space (75 F & 50%RH for cooling, and 68F for heating).

The 1st floor computer area (~132KW or 38 Ton) will be served by a closed loop 55F "electronic cooling water system" (ECW). Except for the ECW header inside the room and the chilled water service to the heat exchanger, the rest of the ECW system, which includes plate heat exchanger, pumps, strainer, UV system, and controls is currently not part of this WBS 3.0, C-0 Outfitting scope. System piping shall be insulated copper. A supplemental computer air handler with no backup, will serve this floor.

The Collision Hall will be served by a dedicated air-handler (estimated at 20 Ton or 8,000 cfm). This air-handler includes chilled water coil, heating coil, and humidifier system to meet the space requirements. There will be two modes of operation,

DETAILED DESCRIPTION**C-0 Outfitting****Section
II**

HVAC-normal mode and ODH-purge mode. The cfm requirement for ODH-purge mode is 5,000 cfm. There will be a combination purge fan / return fan that will handle air from the collision hall. The heater coil will be sized to keep supply air above freezing to preclude bursting of the inside piping during ODH mode condition during winter. Redundant HVAC and fan are NOT required, however fans and heaters, required for ODH purge operation will be connected to the generator. The collision hall requires space temperature of 60F to 80F at 40%RH to 50% relative humidity, except during purge mode. The unit will maintain air dew point to 53F, except during purge mode. The Collision Hall space requires a continuous constant make up air for inert gas purges, of no less than 50 cfm. Make up air requirement based on ASHRAE will also be included. This will be served by a dedicated outdoor make up air. The ODH airflow requirement is 5000 cfm.

The Assembly Hall will be served by a dedicated air handler (estimated at 20-Ton/8,000 cfm) with chilled water coil, and heating coil system to meet the space requirements. There will be two modes of operation, HVAC-normal mode and ODH-purge mode. Where applicable, the unit will utilize an economizer cycle to provide free cooling when outdoor air temperature is appropriate. There will be a combination purge fan / return fan that will handle air from the assembly hall. The heater coil will be sized to keep supply air above freezing to preclude bursting the inside piping during ODH mode condition during winter. Redundant HVAC and fan, and backup power to this unit are NOT required. The Collision Hall requires space temperature of 60F to 80F at 40%RH to 50% relative humidity, except during purge mode. The Assembly Hall space requires a continuous constant make up air for inert gas purges, of no less than 50 cfm. Make up air requirement based on ASHRAE will also be included. This will be served by a dedicated outdoor make up air unit. The ODH airflow requirement is 5000 cfm.

The electronic bridge area will be served with two DX split AC unit. Estimated load given from racks is 2 KW.

There will be one outdoor air-cooled water chiller (no backup), preliminary estimate at 120 ton each, which will provide 45 F glycol-chilled water to the air handlers, make-up air unit and the heat exchanger.

The air handlers, make up air unit, chiller and pump in the mechanical room will be outfitted and will be integrated with site DDC controls building automation system. The building HVAC system will be provided with basic controls and monitoring using DDC (Direct Digital Control) compatible with site wide BAS. The chiller and chilled water loop will be provided with taps and minimum flow, temperature and flow sensors for monitoring purposes and alarm and for future connection to

DETAILED DESCRIPTION**C-0 Outfitting****Section
II**

experiments slow process controls. The chiller and pumps are self-controlled and will be started and switched manually. The chiller will have multiple compressors and built-in staging controls. Chilled water pump shall be manually started and switched. The 3rd floor High-density computer rack cooling system will be monitored only using Metasys DDC. The Assembly Hall and Collision Hall air system, and ODH purge system will be provided with basic HVAC control compatible with site wide BAS. Additional sensors and industrial type controls that may be required specific to the experiments will be design and selected by the experimenter/user and commissioning will be coordinated as required. Other sensors and controls as mandated by ASHRAE 90, where applicable to the building system, will be provided. Electrical Room and elevator shaft will not require any HVAC. Applicable requirement from ASHRAE 90.1 (such as economizer, CO2 sensors, ventilation controls) will be incorporated.

Heating. Air handler will be provided with electric heating coil. The high bay will make use of the existing electric space heater.

Building plumbing.

Condensate drains will be provided for the 1st floor and 3rd floor-cooling unit. The mechanical floor will be reworked to include floor drains. Building plumbing will be sized and designed in accordance with Illinois Plumbing Code.

Fire Protection / Fire Detection

The fire protection systems will comply with the criteria set forth in the National Fire Protection Association pamphlets and National Building Code. In particular, the pamphlets referenced are as follows:

- NFPA 10 – Standard for Portable Fire Extinguishers
- NFPA 13 – Standard for the Installation of Sprinkler Systems
- NFPA 15 – Standard for Water Spray Fixed Systems for Fire Protection
- NFPA 70 – National Electrical Code
- NFPA 72 – National Fire Alarm Code
- NFPA 90A - Standard for the Installation of Air-Conditioning & Ventilating
- NFPA 2001 - Standard on Clean Agent Fire Extinguishing Systems

Currently the existing C-0 Collision Hall has a complete addressable fire alarm system monitoring the entire facility and can be extended to monitor the new fire alarm points. In addition, an existing FIRUS system is installed which signals any fire alarm to our on-site Communications Center, so that emergency personnel can be dispatched.

DETAILED DESCRIPTION**C-0 Outfitting****Section
II**

A description of the fire protection system is as follows:

Collision Hall

Provide a pre-action fire sprinkler system connected to the existing piping network. This system will be designed to provide a minimum of 0.20 gpm per square foot over the most remote 1,950 square feet of sprinkler operation. The pre-action valve will introduce water into the piping network upon loss of air and smoke from an air sampling smoke detection system.

Assembly Hall

Connect with a new sprinkler riser to the existing overhead wet-type fire sprinkler system. This system is designed to provide a minimum of 0.20 gpm per square foot over the most remote 1,500 square feet of sprinkler operation.

Mechanical Rooms

Provide a new wet-type fire sprinkler system utilizing quick response sprinklers, designed to a minimum of 0.15 gpm per square foot over the most remote 950 square feet of sprinkler operation.

Computer/Mezzanine Levels

Provide a new wet-type fire sprinkler system utilizing quick response sprinklers, designed to a minimum of 0.15 gpm square foot over the most remote 950 square feet of sprinkler operation. In addition, a clean agent fire extinguishing system activated by high velocity smoke detection, will be provided to protect the raised computer floors and monitored by an auxiliary releasing fire alarm control panel.

Gas Shed

Provide (IF NECESSARY) a fixed water spray system protecting the gaseous tanks. Requirements will be required during final design.

Electrical

The primary power transformers will be fed from a new 13.8kv feeder routed through spare ducts in the Main Ring duct bank to a breaker at the Kautz Road Substation (KRS). Prior to the installation of this new feeder, feeder 45 will be routed through a new switch at B-4 from an open bay at the B-4 Service Building air switch to the

DETAILED DESCRIPTION**C-0 Outfitting****Section
II**

primary transformers. Feeder 45 will allow approximately 2 megawatts of available power prior to the installation of the new dedicated feeder for equipment power testing and building house power. The feeder will terminate at an air switch located on the primary transformer pad. The final configuration will remove the tie to feeder 45 and install a tie to feeder 49 for backup power. A Kirk key system will be provided. The final installation at C-0 includes one 1500 KVA transformer dedicated to the detector's magnet and other equipment operated by power supplies, one 1500 KVA transformer to supply quiet power for electronics and computers, and one 1500KVA transformer to supply house power. Critical safety systems will be on a 250 KVA generator with automatic transfer switch. User power will terminate at disconnect switches or circuited panel boards in computer rooms. Because of the structural systems planned and the existing constraints, all conduits will be surface mounted.

C-0 Service Building Upgrade

The C-0 Service Building Upgrade provides for the architectural and HVAC modifications and electrical power additions to support the Low Beta System at C-0. The existing service building consists of office space, shops and data rooms. The current office/tech space will accommodate new power supplies for the Low Beta System. HVAC modifications include the addition of exhaust fans and exterior wall louvers to cool the power supply room. A new 1500KVA transformer will be installed outside the C-0 Service Building to support the Low Beta System. The transformer will be connected to the power supplies by underground duct bank through the exterior wall of the service building. The transformer shall be fed from the existing pulse power feeder 23 located in the Main Ring Road duct bank. A new 2000Amp switchboard will be installed. Also fed from feeder 23 are new 500 KVA transformers at Service Buildings B-4 and C-1 that will feed 1200 AMP switchboards. Air switches will be installed to transition from 750 MCM to 350 MCM cable. Other than the power upgrades at B-4 and C-1, no other work in the buildings is anticipated as part of WBS 3.0.

PERFORMANCE REQUIREMENTS**C-0 Outfitting****Section
III****Structural Systems**

Design Loads shall be as listed below and in accordance with the Fermilab Engineering Standards Manual:

- Roofs
 - Live load / snow load = 25 psf
 - Snow drift: 25 – 55 psf
 - width = 6.5 ft.
- Stairs and Landings:
 - Dead load = 75 psf
 - Live load = 100 psf
 - or concentrated load of 300 pounds at center of tread.
- Floors shall be designed to support a concentrated load of 2000 lbs. applied to an area 2'-6" x 2'-6" and a uniform live load of 75 pounds per square foot (PSF) for computer floors and 50 PSF for office floors.

Live Load Reduction:

- Live load reductions are permitted in accordance with code for second floor.
- No live load reductions are permitted for roof or mechanical equipment areas.

Handrails and Guardrails:

- Top rail = 50 plf or 200 lb. concentrated load
(Applied any direction – not simultaneous)
- infill area = 50 lbs. on an area 1'-0" x 1'-0"
(The above loads are not superimposed)

Mechanical Systems

The HVAC systems will conform to ASHRAE 90.1, ASHRAE 62 and applicable NFPA requirements and applicable sections of the Fermilab Engineering Standards Manual

Mechanical systems and controls will be further investigated during subsequent phases in accordance with ASHRAE 90.1 and Federal Life Cycle costing analysis.

PERFORMANCE REQUIREMENTS**C-0 Outfitting****Section
III**

Heating, Ventilation and Air Conditioning Design Parameters:

- Temperature: 65 degrees Fahrenheit to 75 degrees Fahrenheit
- Humidity: 45% -50% Relative Humidity

Electrical Systems

Electrical system modifications will comply with applicable sections of National Electric Code and applicable sections of the Fermilab Engineering Standards Manual.

Primary Supply 480/277 V, 3 phase, 4 wire

Secondary Supply Power Distribution: 120/208 V, 3 phase, 4 wire

Lighting: 277 V

Illumination Levels:

Main Corridor and Public Areas: 20 fc.

Computer Rooms 50 fc.

Interior Emergency Lighting 5 fc.

Fire Protection Systems

Fire Alarm/Fire Suppression systems shall be designed in accordance with the applicable sections of the Fermilab Engineering Standards Manual.

Automatic sprinkler systems shall be designed to a minimum of an Ordinary Hazard Group 1 classification, in accordance with National Fire Protection Association (NFPA) latest edition. The most commonly used NFPA standards relative to automatic sprinkler systems are: 13, 20, 25, 231, 231C, 318, and 750. Fire alarm systems shall be designed with a minimum standby power (battery) capacity. These batteries shall be capable of maintaining the entire system in a non-alarm condition for 24 hours, in addition to 15 minutes in full load alarm condition. The most commonly used NFPA standards relative to fire alarm systems are: 70, 72, 90A, and 318.

REQUIREMENTS AND ASSESSMENTS**C-0 Outfitting****PART 1 SAFEGUARDS AND SECURITY**

Direction for security issues related to the design of this project is taken from the current operating procedures of the laboratory activities.

During non-working hours, when the building is unoccupied, all exterior roll-up and personnel access doors into the building will be locked and security guards will regularly inspect the building during routine security patrols of the Fermilab site.

**Section
IV****PART 2 ENERGY CONSERVATION**

All elements of this project will be reviewed for energy conservation features that can be effectively incorporated into the overall building design. Energy conservation techniques and high efficiency equipment will be utilized wherever appropriate to minimize the total energy consumption of the building.

PART 3 HEALTH AND SAFETY

Exiting for the building will be provided in accordance with NFPA 101 Life Safety Code to assure adequate egress in the event of an emergency. The building will also be provided with portable fire extinguishers appropriate for the intended use of the building.

PART 4 ENVIRONMENTAL PROTECTION

The overall environmental impact of this project will be evaluated and reviewed as required to conform to all applicable portions of the National Environmental Policy Act (NEPA).

PART 5 DECONTAMINATION AND DECOMMISSIONING

Decontamination and decommissioning procedures are an important part of Fermilab environment, safety and health policies. These policies are described in Chapter 8070 of the Fermilab Environment, Safety and Health Manual. Appropriate decontamination and decommissioning procedures will be instituted for this project.

REQUIREMENTS AND ASSESSMENTS**C-0 Outfitting****PART 6 QUALITY ASSURANCE**

All aspects of this project will be periodically reviewed with regard to Quality Assurance issues from Conceptual Design through Title III completion. This review process will be completed in accordance with the applicable portions of the Fermilab Institutional Quality Assurance Program (FIQAP) currently under final development. The following elements will be included in the Fermilab Quality Assurance Program for the design and construction effort:

- An identification of staff assigned to this project with clear definition of responsibility levels and limit of authority as well as delineated lines of communication for exchange of information.
- Requirements for control of design criteria and criteria changes and recording of standards and codes used in the development of the criteria.
- Periodic review of design process, drawings and specification to insure compliance with accepted design criteria.
- Identification of underground utilities and facility interface points prior to the commencement of any construction in affected areas.
- Conformance to procedures regarding project updating and compliance with the approved construction schedule.
- Conformance to procedures regarding the review and approval of shop drawings, samples test results and other required submittals.
- Conformance to procedures for site inspection by Fermilab personnel to record construction progress and adherence to the approved contract documents.
- Verification of project completion, satisfactory system start-up and final project acceptance

PART 7 MAINTENANCE AND OPERATION

When completed, this project will become the formal responsibility of the Fermilab Particle Physics Division. The completed project, the utilities and systems that support it, will be added to the overall laboratory maintenance and building inspection program of the Facilities Engineering Services Section. The Facilities Engineering Services Section and Particle Physics Division will coordinate all preventative maintenance, normal service and emergency repairs for the building.

The Building Research Board National Research Council states that if a building receives an adequate level of maintenance and repair funding, a steady-state situation should exist wherein the inventory would remain in a service condition

**Section
IV**

REQUIREMENTS AND ASSESSMENTS

C-0 Outfitting

that would neither decline nor improve and a maintenance and repair backlog would not develop. Maintenance is defined as the day-to-

day work necessary to sustain property in order to realize the originally anticipated useful life of a fixed asset. Maintenance includes periodic inspection, adjustment, lubrication, and cleaning (non janitorial) of equipment, replacement of parts etc. to assure continuing service and to prevent breakdown. Repair is defined as the work required to restore damaged or worn-out property to a normal operating condition. In general, repairs are curative and maintenance is preventive.

Operations are the activities related to a building's normal performance of the function for which it is used. The cost of utilities, janitorial services, window cleaning, rodent control and waste management are generally included within the scope of operations and are not maintenance.

The following preliminary maintenance and repair costs forecast is based on information contained in the Whitestone Building and Repair Cost Reference 2002 escalated to FY2005 and indexed for the Chicago, Illinois area. The Building M&R Cost Profile is based on the Community Center model. While not an exact match, the functions and basic material selections are considered similar in nature to provide a preliminary forecast of maintenance and repair costs for this project.

	Annual Cost Per Square Foot	Annual Cost as % of Replacement Cost
Cost (FY2004)		
PM and Minor Repair	\$1.00	1.04%
Unscheduled Maintenance	\$1.15	1.18%
Renewal and Replacement	\$3.03	3.12%
Total M&R Costs	\$5.18	5.34%

If requested, a detailed maintenance and repair forecast for this project will be developed after the completion of Title 3. A copy of the referenced Whitestone Building and Repair Cost Reference data is included in the Appendix of this document.

PART 8 TELECOMMUNICATIONS

The existing Fermilab telephone communications network is adequate to provide

REQUIREMENTS AND ASSESSMENTS**C-0 Outfitting**

normal telecommunication support to the new work.

PART 9 COMPUTER EQUIPMENT

Access to the central computing cluster, located in the Feynman Computing Center will be provided by extending the existing data communication network in the Main Ring ductbank.

PART 10 HANDICAPPED PROVISIONS

The applicable requirements of the Uniform Federal Accessibility Standards (UFAS), Americans with Disabilities Act (ADA) and the Americans with Disabilities Act Accessibility Guidelines (ADAAG) will be incorporated into the design of this project. Compliance with the ADA will be based upon an evaluation of the job descriptions and required tasks for the personnel assigned to work in this building. Those areas included in the scope of this project that will require accessibility as well as the established routes to those areas will be designed in full compliance with the existing statutes.

PART 11 EMERGENCY SHELTER PROVISIONS

Required provision for occupant protection in the event of tornadoes or other extreme weather conditions are provided within the existing building. Guidelines established by the Federal Emergency Management Agency (FEMA) in publications TR-83A and TR-83B will be used to assess the existing building and addition to insure safe areas within the building for the protection of building occupants.

APPLICABLE CODES, STANDARDS AND QUALITY LEVELS

C-0 Outfitting

Section V

The design of this project will be in accordance with recognized architectural and engineering practice and will comply with the applicable portions of the of the U.S. Department of Energy and the State of Illinois codes, orders and regulation as incorporated into contract No. DE-AC02-76CH0300 between the US Department of Energy and Universities Research Association.

IDOT, Standard Specifications for Road and Bridge Construction, latest edition

IEPA, Illinois Urban Manual

AASHTO, American Association of State Highway and Transportation Officials

ASTM, American Society for Testing Materials

10 CFR Part 435 Subpart A / ASHRAE 90.1 – 1989

Clean Water Act

Safe Drinking Water Act

BOCA National Building Code

International Building Code 2000

NFPA - 101, Life Safety Code

State of Illinois accessibility standards

Americans with Disabilities Act (ADA)

Americans with Disabilities Act Accessibility Guidelines (ADAAG)

Uniform Federal Accessibility Standards (UFAS)

FEMA TR-83A, Interim Guidelines for Building Occupant Protection from Tornadoes and Extreme Winds

FEMA TR-83B, Tornado Protection - Selecting and Designing Safe Areas in Buildings

American Concrete Institute (ACI), Building Code Requirements for Structural Concrete, ACI 318, latest edition

ACI 530/ASCE 5/TMS 402 - Building Code Requirements for Masonry Structures; American Concrete Institute International; 1995.

ACI 530.1/ASCE 6/TMS 602 - Specification For Masonry Structures; American CRSI (Concrete Reinforcing Steel Institute)

American Institute of Steel Construction, Specification for the Design, Fabrication and Erection of Structural Steel for Buildings, latest edition

ASTM (American Society for Testing and Materials)

AWS (American Welding Society)

SDI (Steel Deck Institute), Design Manual for Composite Decks, Form Decks and Roof Decks.

CFR (Code of Federal Regulations)

29 CFR 1910 Occupational Safety and Health Standards

29 CFR 1926 Safety and Health Regulations for Construction

77 IAC 890 (Illinois Plumbing Code)

ANSI/ASHRAE 14 (Mechanical refrigeration)

ANSI/ASME B31.5 (Refrigeration piping)

ANSI/ASME B31.8 (Gas transmission and piping systems)

ASME Pressure Vessel Code-Section VIII

ASME (American Society of Mechanical Engineers)

A17.1 Safety Code for Elevators and Escalators

NEMA (National Electrical Manufacturers Association)

NFPA (National Fire Protection Association)

NFPA 70 National Electric Code

NFPA 80 (National Fire Protection Agency) Fire Doors and Windows

APPLICABLE CODES, STANDARDS AND QUALITY LEVELS

C-0 Outfitting

Electrical: American National Standards Institute, National Electrical Safety Code, National Electrical Safety Code, ANSI C2, latest edition

Building Code Examination

Introduction

This is a building code examination for the B-TeV project at the existing C-0 Collision Hall. The project includes modifying the existing C-0 Collision Hall to accommodate three stories consisting of research laboratory, basement level consisting of mechanical support room, and a sub-basement consisting of a staging area. There will be an elevator for moving people and computer equipment. A typical computer floor is approximately 2,080 sq. ft., the mechanical support room is approximately 300 sq. ft., and the remaining area is 2,540 sq. ft. for a combined total of approximately 9,000 sq. ft. The structure will be approximately 35 feet in height above grade level, that is, of exposed wall and roof construction. The building construction primary consists of post-tension concrete and steel structural beams. There will be two stairways and three exterior doors constructed to accommodate egress. Finally, the building will be equipped with a fully automatic sprinkler system and fire alarm system. This examination excludes the Collision Hall.

Section V

Criteria Evaluation

The following was used for the model building code evaluation and requires independent reviews from Fermilab's outside fire protection engineering consultant and in-house comment and compliance review.

- DOE Order 420.1, Fire Protection – Section 4.2
- IBC, International Building Code, 2000 Edition
- NFPA 101, Life Safety Code, 2000 Edition
- NFPA 13, Standard of Installation of Automatic Sprinkler, 1999 Edition
- NFPA 70, National Electrical Code, 2002 Edition
- NFPA 72, Fire Alarm Code, 1999 Edition
- NFPA 75, Standard for the Protection of Information Technology, 2000 Edition
- NFPA 90A, Standard for Installation of Air-Conditioning, 1999 Edition
- ASHRAE Standard 90.1 - 1989
- ANSI 17.1 Safety Code for Elevators and Escalators, 2000 Edition
- Fermilab Environment, Safety and Health (ES&H) Manual
- Fermilab Engineering Standards

Examination

Occupancy Type

The uses will be limited to a research laboratory and as such, is classified by IBC Table 304 and NFPA 101 Section 3.3.134 as a Business Occupancy, "B".

**APPLICABLE CODES, STANDARDS
AND QUALITY LEVELS****C-0 Outfitting****Building Height and Area Limitations**

The building will have a complete automatic sprinkler system and as such is allowed to be over three stories, limited to 60-feet in height, per the IBC. The building area is 9,000 square feet, less than the restricted 23,000 square feet permitted by IBC. Therefore, the building height and area is within the building area and height is within IBC Table 503 limitations.

Construction Type

In general, the building will be constructed of steel beams and concrete floors, unprotected and noncombustible. Therefore, the building is a Type II-B construction as defined by IBC, Section 602.2.

Wall and Floor Fire Separation

There is no requirement for fire rating the floors per IBC Section 602 and Section 713

**Section
V****Vertical Opening Fire Separation**

The building will have three vertical openings that penetrate the main floors. These openings consist of two stairways and one elevator. The West stairway connecting all three stories will be constructed of a minimum of 1-hour fire resistive construction as defined by IBC Section 707 and 1003. The East stairway connecting all three stories and basements will be constructed of a minimum of 2-hour fire resistive construction as defined by IBC Section 707 and 1003. Both stairways will have a minimum width of 44-inches as outlined in IBC 1003.

The Elevator and utility shaft will be construction of a minimum of 2-hour fire resistive construction in accordance with IBC Section 707. The elevator will be classified as Limited-Use/Limited Application as defined by ANSI 17.1. Power disconnected will be provide in accordance with ANSI 17.1, Section 2.8 and the Emergency Operation and Signaling will comply with ANSI 17.1 Section 5.2.1.27.

Means of Egress

The building will have a minimum of two exits that discharge directly to the outside and two Stairwell exits that will also discharge directly to the outside serving the upper floors. The calculated occupant load for the building per NFPA 7.3.1.2 is 90 persons. The calculated occupant load is based on an occupant load factor of 1 person per 100 sq. ft gross floor area. The exit capacity is based on the exit doors, each having a clear width of 34-inches in accordance with NFPA 101, Section 7.2.1.2.2. The exit capacity can handle 850 persons and therefore, complies with IBC and NFPA egress requirements.

The travel distance length to an exit is 60-feet and is within the 300-feet limitation of NFPA 101, Section 38.2.6. The common path of travel is approximately 30-feet and is within the 75-feet limitation of NFP 101, Section 38.2.5.3. The dead corridor at column line 5 and C, is approximately 30-feet and is within the 50-feet limitation of NFPA 101, Section 38.2.5.2.

Fire Protection Systems

**APPLICABLE CODES, STANDARDS
AND QUALITY LEVELS****C-0 Outfitting**

Automatic sprinkler systems will be an Ordinary Hazard Group I installed throughout the facility, and will be designed and installed in accordance with NFPA 13 and the Fermilab Engineering Standards. Fire alarm system will be installed throughout the facility and will be designed and installed in accordance with NFP 72 and the Fermilab Engineering Standards.

Other Building Components

Smoke detection will be installed below the raised computer floors and at the air handling units with automatic shut down of the air handling units, in accordance with NFPA 72, 75, and 90A. Exit signage and emergency lighting will be provided in accordance with NFPA 101. All electrical components will be installed in accordance NEC and Fermilab's standards. Lastly, all air handling and plumbing components will be installed in accordance with IBC, NFPA, ASHRA, and Illinois plumbing code.

**Section
V****LEED Analysis**

The C-0 Outfitting project has been review for potential sustainable design features based on the LEED Project Checklist. A copy of the checklist is included in the appendix. At this time it is not anticipated that this project will pursue LEED certification but the design of the project will strive to conform to the principles of sustainable design. The LEED project checklist will be reviewed during each stage of the design to monitor progress on fulfilling the requirements of the credits that have been identified as achievable.

BTeV - WBS 3.0 C0 Building Outfitting												12Apr04
Total Construction Costs												
Fermilab Labor: Salary, OPTO, Vacation, Fringe & Overhead												
Non-Fermilab Labor: Salary, Benefits & Overhead												
No Escalation, No Full material Procurement 'Burdening'												
Activity ID	Activity Description	Duration	Labor and Material & Services Resource Information	Material & Services Cost	Labor Cost	Base Budget	Labor Contingency (%)	Materials & Services Contingency (%)	Labor Contingency (\$)	Materials & Services Contingency (\$)	Total Budget (Base + Contingency)	
				\$262,715	\$0	\$262,715			\$0	\$52,543	\$315,258	
1.3.16.1	S & A Electrical Devices	90d		\$0	\$0	\$0	0%	0%	\$0	\$0	\$0	
1.3.16.2	Rough In House Power EI 715'-0	25d	BTEV.MANDSEXEMPT,80659	\$80,659	\$0	\$80,659	0%	20%	\$0	\$16,131	\$96,790	
1.3.16.7	Coll Hall Power	15d	BTEV.MANDSEXEMPT,91439	\$91,439	\$0	\$91,439	0%	20%	\$0	\$18,287	\$109,726	
1.3.16.8	Trim Out House Power EI 715'-0	20d	BTEV.MANDSEXEMPT,80659	\$80,659	\$0	\$80,659	0%	20%	\$0	\$16,131	\$96,790	
1.3.16.13	Install Exist. 2000 Amp Switchbd	14d	BTEV.MANDSEXEMPT,9958	\$9,958	\$0	\$9,958	0%	20%	\$0	\$1,991	\$11,949	
1.3.16.14	Pull and terminate secondary	6d		\$0	\$0	\$0	0%	20%	\$0	\$0	\$0	
1.3.18 -- Feeder From B-4 to C-0												
				\$434,278	\$0	\$434,278			\$0	\$86,855	\$521,133	
1.3.18.1	Concrete and Rebar SD	21d		\$0	\$0	\$0	0%	0%	\$0	\$0	\$0	
1.3.18.2	Install Duct bank B-4 to Berm	7d	BTEV.MANDSEXEMPT,42838	\$42,838	\$0	\$42,838	0%	20%	\$0	\$8,567	\$51,405	
1.3.18.3	Jack Carrier pipe thru berm	7d	BTEV.MANDSEXEMPT,21420	\$21,420	\$0	\$21,420	0%	20%	\$0	\$4,284	\$25,704	
1.3.18.5	Install duct bank MH to C-0 Pad	14d	BTEV.MANDSEXEMPT,42838	\$42,838	\$0	\$42,838	0%	20%	\$0	\$8,567	\$51,405	
1.3.18.6	Install secondary duct bank	9d	BTEV.MANDSEXEMPT,149908	\$149,908	\$0	\$149,908	0%	20%	\$0	\$29,981	\$179,889	
1.3.18.7	Install Pad, C-0 Test Area	14d	BTEV.MANDSEXEMPT,53652	\$53,652	\$0	\$53,652	0%	20%	\$0	\$10,730	\$64,382	
1.3.18.8	Install switch Pad at B-4	5d		\$0	\$0	\$0	0%	20%	\$0	\$0	\$0	
1.3.18.9	Set switch at B-4	1d	BTEV.MANDSEXEMPT,2400	\$2,400	\$0	\$2,400	0%	20%	\$0	\$480	\$2,880	
1.3.18.10	Set Transformers C-0	3d	BTEV.MANDSEXEMPT,25200	\$25,200	\$0	\$25,200	0%	20%	\$0	\$5,040	\$30,240	
1.3.18.11	Set Switch C-0 Test	1d	BTEV.MANDSEXEMPT,2400	\$2,400	\$0	\$2,400	0%	20%	\$0	\$480	\$2,880	
1.3.18.12	Set Generator C-0 Test	1d	BTEV.MANDSEXEMPT,75531	\$75,531	\$0	\$75,531	0%	20%	\$0	\$15,106	\$90,637	
1.3.18.14	Pull Feeder B-4 to C-0 Test Area	3d		\$0	\$0	\$0	0%	20%	\$0	\$0	\$0	
1.3.18.15	Terminate Primary	1d		\$0	\$0	\$0	0%	20%	\$0	\$0	\$0	
1.3.18.16	Rerack Main Ring Manholes	15d	BTEV.MANDSEXEMPT,18091	\$18,091	\$0	\$18,091	0%	20%	\$0	\$3,618	\$21,709	
2 -- C-0 Outfitting Phase 2												
				\$1,859,031	\$444,071	\$2,303,102			\$88,814	\$408,058	\$2,799,975	
2.1 -- Design to Award C-0 Phase 2												
				\$46,400	\$187,185	\$233,585			\$37,437	\$9,280	\$280,303	
2.1.1 -- Title II EDIA FESS												
				\$0	\$187,185	\$187,185			\$37,437	\$0	\$224,623	
2.1.1	Title II EDIA FESS	50d	BTEV.FNAL.FESS.EE,2221	\$0	\$187,185	\$187,185	20%	0%	\$37,437	\$0	\$224,623	
2.1.2 -- Title II EDIA Consultant												
				\$46,400	\$0	\$46,400			\$0	\$9,280	\$55,680	
2.1.2	Title II EDIA Consultant	40d	BTEV.FNAL.MANDS.BASE,40000	\$46,400	\$0	\$46,400	0%	20%	\$0	\$9,280	\$55,680	
2.1.3 -- Construction Req.												
				\$0	\$0	\$0			\$0	\$0	\$0	
2.1.3	Construction Req.	5d		\$0	\$0	\$0	0%	0%	\$0	\$0	\$0	
2.1.4 -- Release for Bid												
				\$0	\$0	\$0			\$0	\$0	\$0	
2.1.4	Release for Bid	5d		\$0	\$0	\$0	0%	0%	\$0	\$0	\$0	

4 of 12

WBS3_0

BTeV - WBS 3.0 C0 Building Outfitting												12Apr04
Total Construction Costs												
Fermilab Labor: Salary, OPTO, Vacation, Fringe & Overhead												
Non-Fermilab Labor: Salary, Benefits & Overhead												
No Escalation, No Full material Procurement 'Burdening'												
Activity ID	Activity Description	Duration	Labor and Material & Services Resource Information	Material & Services Cost	Labor Cost	Base Budget	Labor Contingency (%)	Materials & Services Contingency (%)	Labor Contingency (\$)	Materials & Services Contingency (\$)	Total Budget (Base + Contingency)	
2.3.8.8	Install Computer Floor EI 746'-6	10d	BTEV.FNAL.MANDS.BASE,62795	\$72,842	\$0	\$72,842	0%	22%	\$0	\$16,025	\$88,867	
2.3.8.9	Install Computer Floor EI. 766'-0	10d	BTEV.FNAL.MANDS.BASE,62795	\$72,842	\$0	\$72,842	0%	22%	\$0	\$16,025	\$88,867	
2.3.8.10	C-0 Service Bldg. Mods	25d	BTEV.FNAL.MANDS.BASE,51096	\$59,271	\$0	\$59,271	0%	22%	\$0	\$13,039	\$72,311	
2.3.9 -- HVAC System												
				\$475,946	\$0	\$475,946			\$0	\$104,708	\$580,654	
2.3.9.1	S & A HVAC Units	21d		\$0	\$0	\$0	0%	0%	\$0	\$0	\$0	
2.3.9.2	F & D HVAC Units	30d		\$0	\$0	\$0	0%	0%	\$0	\$0	\$0	
2.3.9.3	Install HVAC Units Coll. Hall & Assem Hall	15d	BTEV.FNAL.MANDS.BASE,69149	\$80,212	\$0	\$80,212	0%	22%	\$0	\$17,646	\$97,859	
2.3.9.4	Install HVAC Units + Off & MUA	10d	BTEV.FNAL.MANDS.BASE,30098	\$34,913	\$0	\$34,913	0%	22%	\$0	\$7,681	\$42,594	
2.3.9.5	Collision Hall work, (Duct, fancoil, Piping	3d	BTEV.FNAL.MANDS.BASE,32105	\$37,241	\$0	\$37,241	0%	22%	\$0	\$8,193	\$45,434	
2.3.9.6	Duct Work	6d	BTEV.FNAL.MANDS.BASE,66438	\$77,068	\$0	\$77,068	0%	22%	\$0	\$16,954	\$94,023	
2.3.9.7	Install Ductwk EI 755'-4"	15d	BTEV.FNAL.MANDS.BASE,9878	\$11,458	\$0	\$11,458	0%	22%	\$0	\$2,520	\$13,979	
2.3.9.8	Install Motorized Dampers and Louvers	5d	BTEV.FNAL.MANDS.BASE,12348	\$14,323	\$0	\$14,323	0%	22%	\$0	\$3,151	\$17,474	
2.3.9.9	Comm. and Training HVAC	1d	BTEV.MANDSEXEMPT,18522	\$18,522	\$0	\$18,522	0%	22%	\$0	\$4,074	\$22,596	
2.3.9.10	Insulate Ductwork	4d	BTEV.MANDSEXEMPT,37044	\$37,044	\$0	\$37,044	0%	22%	\$0	\$8,149	\$45,193	
2.3.9.11	Install Toilet Room Exhaust	2d	BTEV.MANDSEXEMPT,3704	\$3,704	\$0	\$3,704	0%	22%	\$0	\$814	\$4,518	
2.3.9.12	Install Mech Rom Exhaust	2d	BTEV.MANDSEXEMPT,6174	\$6,174	\$0	\$6,174	0%	22%	\$0	\$1,358	\$7,532	
2.3.9.13	Install DCW pipe and Humidifier	2d	BTEV.MANDSEXEMPT,14818	\$14,818	\$0	\$14,818	0%	22%	\$0	\$3,259	\$18,077	
2.3.9.14	Balance HVAC System, Assy, Off & MUA	2d	BTEV.MANDSEXEMPT,5704	\$5,704	\$0	\$5,704	0%	22%	\$0	\$1,254	\$6,958	
2.3.9.15	Balance HVAC Sys. Col Hall	2d	BTEV.MANDSEXEMPT,2444	\$2,444	\$0	\$2,444	0%	22%	\$0	\$537	\$2,981	
2.3.9.16	Install Sensors and Controls	5d	BTEV.MANDSEXEMPT,58344	\$58,344	\$0	\$58,344	0%	22%	\$0	\$12,835	\$71,179	
2.3.9.17	Start Up and Comm (Non Shutdownwn Related)	4d	BTEV.MANDSEXEMPT,19244	\$19,244	\$0	\$19,244	0%	22%	\$0	\$4,233	\$23,477	
2.3.9.18	Start Up and Comm (Shutdown Related)	10d	BTEV.MANDSEXEMPT,19244	\$19,244	\$0	\$19,244	0%	22%	\$0	\$4,233	\$23,477	
2.3.9.19	Install Bridge HVAC Unit Piping and Startup	4d	BTEV.MANDSEXEMPT,12348	\$12,348	\$0	\$12,348	0%	22%	\$0	\$2,716	\$15,064	
2.3.9.20	Install CRAC Condensing Unit AC for EI 746	6d	BTEV.MANDSEXEMPT,16719	\$16,719	\$0	\$16,719	0%	22%	\$0	\$3,678	\$20,397	
2.3.9.21	Install Ref Piping Test, Fill and Charge Ins and Startup	4d	BTEV.MANDSEXEMPT,6419	\$6,419	\$0	\$6,419	0%	22%	\$0	\$1,412	\$7,831	
2.3.10 -- Chilled Water System (CHW)												
				\$281,095	\$0	\$281,095			\$0	\$61,840	\$342,935	
2.3.10.1	S & A Chillers, W/ Controls	21d		\$0	\$0	\$0	0%	0%	\$0	\$0	\$0	
2.3.10.2	F & D Chillers W/ Controls	50d		\$0	\$0	\$0	0%	0%	\$0	\$0	\$0	
2.3.10.3	S & A Chilled Water Pumps	21d		\$0	\$0	\$0	0%	0%	\$0	\$0	\$0	
2.3.10.4	F & D Chilled Water Pumps	36d		\$0	\$0	\$0	0%	0%	\$0	\$0	\$0	
2.3.10.5	Install Chillers	3d	BTEV.MANDSEXEMPT,110416	\$110,416	\$0	\$110,416	0%	22%	\$0	\$24,291	\$134,707	
2.3.10.6	Install Chilled Water Pumps	5d	BTEV.MANDSEXEMPT,4229	\$4,229	\$0	\$4,229	0%	22%	\$0	\$930	\$5,159	
2.3.10.7	Install CHW piping supports and Fittings	10d	BTEV.MANDSEXEMPT,43909	\$43,909	\$0	\$43,909	0%	22%	\$0	\$9,659	\$53,568	
2.3.10.8	Install Tanks and Othere Hydronic items	10d	BTEV.MANDSEXEMPT,11082	\$11,082	\$0	\$11,082	0%	22%	\$0	\$2,438	\$13,520	
2.3.10.9	Install ECW pipe header on 756 Comp Rm.	6d	BTEV.MANDSEXEMPT,17100	\$17,100	\$0	\$17,100	0%	22%	\$0	\$3,762	\$20,862	
2.3.10.10	Leak test and Insulate ECW Header	4d	BTEV.MANDSEXEMPT,5700	\$5,700	\$0	\$5,700	0%	22%	\$0	\$1,254	\$6,954	
2.3.10.11	Leak test & Insulate CHW	6d	BTEV.MANDSEXEMPT,9567	\$9,567	\$0	\$9,567	0%	22%	\$0	\$2,104	\$11,671	
2.3.10.12	Install Sensors and Controls	6d	BTEV.MANDSEXEMPT,49593	\$49,593	\$0	\$49,593	0%	22%	\$0	\$10,910	\$60,503	

BTeV - WBS 3.0 C0 Building Outfitting												12Apr04
Total Construction Costs												
Fermilab Labor: Salary, OPTO, Vacation, Fringe & Overhead												
Non-Fermilab Labor: Salary, Benefits & Overhead												
No Escalation, No Full material Procurement 'Burdening'												
Activity ID	Activity Description	Duration	Labor and Material & Services Resource Information	Material & Services Cost	Labor Cost	Base Budget	Labor Contingency (%)	Materials & Services Contingency (%)	Labor Contingency (\$)	Materials & Services Contingency (\$)	Total Budget (Base + Contingency)	
				\$242,440	\$0	\$242,440			\$0	\$48,488	\$290,928	
4.8	C SectorTrans. procure and delivery	105d	BTEV.FNAL.MANDS.BASE,209000	\$242,440	\$0	\$242,440	0%	20%	\$0	\$48,488	\$290,928	
4.9 -- Bid and award Air switch												
				\$0	\$0	\$0			\$0	\$0	\$0	
				\$0	\$0	\$0			\$0	\$0	\$0	
4.9	Bid and award Air switch	42d		\$0	\$0	\$0	0%	20%	\$0	\$0	\$0	
4.10 -- Phase 1 4-Bay Switch Procure and Delivery												
				\$29,179	\$0	\$29,179			\$0	\$5,835	\$35,015	
				\$29,179	\$0	\$29,179			\$0	\$5,835	\$35,015	
4.10	Phase 1 4-Bay Switch Procure and Delivery	75d	BTEV.FNAL.MANDS.BASE,25155	\$29,179	\$0	\$29,179	0%	20%	\$0	\$5,835	\$35,015	
4.11 -- C Sector 4-Bay Switch procure and delivery												
				\$29,178	\$0	\$29,178			\$0	\$5,835	\$35,014	
				\$29,178	\$0	\$29,178			\$0	\$5,835	\$35,014	
4.11	C Sector 4-Bay Switch procure and delivery	75d	BTEV.FNAL.MANDS.BASE,25154	\$29,178	\$0	\$29,178	0%	20%	\$0	\$5,835	\$35,014	
5 -- Milestones												
				\$0	\$0	\$0			\$0	\$0	\$0	
5.1 -- Lev2Mil: MS-1 Start Engineering												
				\$0	\$0	\$0			\$0	\$0	\$0	
				\$0	\$0	\$0			\$0	\$0	\$0	
5.1	Lev2Mil: MS-1 Start Engineering	0		\$0	\$0	\$0	0%	0%	\$0	\$0	\$0	
5.2 -- Lev1Mil: MS-2 Start Construction												
				\$0	\$0	\$0			\$0	\$0	\$0	
				\$0	\$0	\$0			\$0	\$0	\$0	
5.2	Lev1Mil: MS-2 Start Construction	0		\$0	\$0	\$0	0%	0%	\$0	\$0	\$0	
5.3 -- Lev3Mil: MS-3 Side Bay. Struct. Complete												
				\$0	\$0	\$0			\$0	\$0	\$0	
				\$0	\$0	\$0			\$0	\$0	\$0	
5.3	Lev3Mil: MS-3 Side Bay. Struct. Complete	0		\$0	\$0	\$0	0%	0%	\$0	\$0	\$0	
5.4 -- Lev3Mil: MS-4 Temo Power Operational (Fdr 45)												
				\$0	\$0	\$0			\$0	\$0	\$0	
				\$0	\$0	\$0			\$0	\$0	\$0	
5.4	Lev3Mil: MS-4 Temo Power Operational (Fdr 45)	0		\$0	\$0	\$0	0%	0%	\$0	\$0	\$0	
5.5 -- Lev1Mil: MS-5 Beneficial occupancy of lower level and upper staging area												
				\$0	\$0	\$0			\$0	\$0	\$0	
				\$0	\$0	\$0			\$0	\$0	\$0	

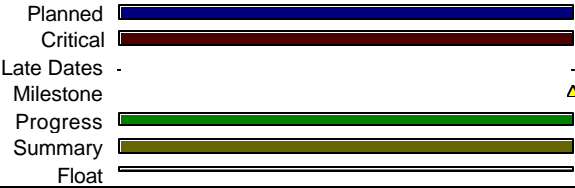
11 of 12

WBS3_0

BTeV - WBS 3.0 C0 Building Outfitting												12Apr04
Total Construction Costs												
Fermilab Labor: Salary, OPTO, Vacation, Fringe & Overhead												
Non-Fermilab Labor: Salary, Benefits & Overhead												
No Escalation, No Full material Procurement 'Burdening'												
Activity ID	Activity Description	Duration	Labor and Material & Services Resource Information	Material & Services Cost	Labor Cost	Base Budget	Labor Contingency (%)	Materials & Services Contingency (%)	Labor Contingency (\$)	Materials & Services Contingency (\$)	Total Budget (Base + Contingency)	
5.5	Lev1Mil: MS-5 Beneficial occupancy of lower level and upper staging area	0		\$0	\$0	\$0	0%	0%	\$0	\$0	\$0	
5.6 -- Lev1Mil: MS-6 Collision Hall Complete												
				\$0	\$0	\$0			\$0	\$0	\$0	
				\$0	\$0	\$0			\$0	\$0	\$0	
5.6	Lev1Mil: MS-6 Collision Hall Complete	0		\$0	\$0	\$0	0%	0%	\$0	\$0	\$0	
5.7 -- Lev3Mil: MS-7 Mechancal Systems Complete (Except CH)												
				\$0	\$0	\$0			\$0	\$0	\$0	
				\$0	\$0	\$0			\$0	\$0	\$0	
5.7	Lev3Mil: MS-7 Mechancal Systems Complete (Except CH)	0		\$0	\$0	\$0	0%	0%	\$0	\$0	\$0	
5.8 -- Lev3Mil: MS-8 Electrical Systems Complete												
				\$0	\$0	\$0			\$0	\$0	\$0	
				\$0	\$0	\$0			\$0	\$0	\$0	
5.8	Lev3Mil: MS-8 Electrical Systems Complete	0		\$0	\$0	\$0	0%	0%	\$0	\$0	\$0	
5.9 -- Lev1Mil: MS-9 Assembly, Service Building Construction Complete												
				\$0	\$0	\$0			\$0	\$0	\$0	
				\$0	\$0	\$0			\$0	\$0	\$0	
5.9	Lev1Mil: MS-9 Assembly, Service Building Construction Complete	0		\$0	\$0	\$0	0%	0%	\$0	\$0	\$0	
5.10 -- Lev2Mil: MS-10 Engineering Complete												
				\$0	\$0	\$0			\$0	\$0	\$0	
				\$0	\$0	\$0			\$0	\$0	\$0	
5.10	Lev2Mil: MS-10 Engineering Complete	0		\$0	\$0	\$0	0%	0%	\$0	\$0	\$0	
5.12 -- Level 1 & Inter-Subproject Link Milestones												
				\$0	\$0	\$0			\$0	\$0	\$0	
5.12.2 -- Construction Phase Milestones												
				\$0	\$0	\$0			\$0	\$0	\$0	
5.12.2.1	Lnk1Mil: Start Construction Phase	0		\$0	\$0	\$0	0%	0%	\$0	\$0	\$0	
5.12.2.2	Lnk1Mil: Begin FY05 Shutdown	0		\$0	\$0	\$0	0%	0%	\$0	\$0	\$0	
5.12.2.3	Lnk1Mil: End FY05 Shutdown	0		\$0	\$0	\$0	0%	0%	\$0	\$0	\$0	
5.12.2.4	Lnk1Mil: Begin FY06	0		\$0	\$0	\$0	0%	0%	\$0	\$0	\$0	
5.12.2.5	Lnk1 Mil: Begin FY06 Shutdown	0		\$0	\$0	\$0	0%	0%	\$0	\$0	\$0	
5.12.2.6	Lnk1Mil: End FY06 Shutdown	0		\$0	\$0	\$0	0%	0%	\$0	\$0	\$0	
5.12.2.7	Lnk1Mil: Start FY07	0		\$0	\$0	\$0	0%	0%	\$0	\$0	\$0	
5.12.2.8	Lnk1Mil: Begin FY07 Shutdown	0		\$0	\$0	\$0	0%	0%	\$0	\$0	\$0	
5.12.2.9	Lnk1Mil: End FY07 Shutdown	0		\$0	\$0	\$0	0%	0%	\$0	\$0	\$0	

BTeV - WBS 3.0 C0 Building Outfitting
Total Construction Cost Profile (\$K) by Institution & Fiscal Year
Fermilab Labor: Salary, OPTO, Vacation, Fringe & Overhead
Non-Fermilab Labor: Salary, Benefits & Overhead
No Contingency, No Escalation, No Full material Procurement 'Burdening'

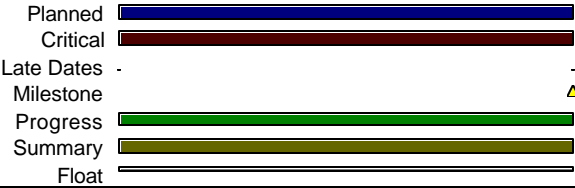
12Apr04



Activity ID	Activity Description	Materials & Services Costs	Labor Costs	Total Cost	Early Start	Early Finish	Float	FY04	FY05	FY06	FY07	FY08
1	C-0 Outfitting Phase 1	\$1,812,958	\$426,288	\$2,239,246	01Oct04	28Sep06	1d		1			
1.1	Design to Award C-0 Phase 1	\$66,515	\$166,537	\$233,052	01Oct04	27Jan05	1d		1.1			
1.1.1	Title II EDIA FESS Phase 1	\$0	\$166,537	\$166,537	01Oct04	25Nov04	1d		1.1.1			
1.1.2	Title II EDIA Consultant Phase 1	\$66,515	\$0	\$66,515	15Oct04	25Nov04	1d		1.1.2			
1.1.3	Construction Req.	\$0	\$0	\$0	26Nov04	02Dec04	1d		1.1.3			
1.1.4	Release for Bid	\$0	\$0	\$0	03Dec04	09Dec04	1d		1.1.4			
1.1.5	Pre-Bid Meeting	\$0	\$0	\$0	31Dec04	31Dec04	15d		1.1.5			
1.1.6	Establish Source Criteria	\$0	\$0	\$0	07Jan05	11Jan05	11d		1.1.6			
1.1.7	Receive Proposals	\$0	\$0	\$0	10Dec04	06Jan05	1d		1.1.7			
1.1.8	Source Selection& Award	\$0	\$0	\$0	07Jan05	27Jan05	1d		1.1.8			
1.2	Title 3 EDIA C-0 Outfitting Phase 1	\$0	\$259,750	\$259,750	28Jan05	28Sep06	1d		1.2			
1.3	C-0 Outfitting Phase 1 Construction Contract	\$1,746,442	\$0	\$1,746,442	28Jan05	28Sep06	1d		1.3			
1.3.1	Notice to Proceed	\$0	\$0	\$0	28Jan05	28Jan05	11d		1.3.1			
1.3.2	Mobilize	\$18,580	\$0	\$18,580	31Jan05	11Feb05	11d		1.3.2			
1.3.3	Site Concrete	\$30,423	\$0	\$30,423	14Feb05	15Apr05	16d		1.3.3			
1.3.3.1	S & A Concrete Mix	\$0	\$0	\$0	14Feb05	14Mar05	16d		1.3.3.1			
1.3.3.2	S & A Rebar	\$0	\$0	\$0	14Feb05	14Mar05	16d		1.3.3.2			
1.3.3.3	FBP Foundations at Stair	\$7,047	\$0	\$7,047	15Mar05	23Mar05	16d		1.3.3.3			
1.3.3.8	Construct Hardstands	\$14,227	\$0	\$14,227	24Mar05	06Apr05	16d		1.3.3.8			
1.3.3.10	Site Utilities	\$5,568	\$0	\$5,568	07Apr05	15Apr05	16d		1.3.3.10			
1.3.3.11	Rework Temp Power	\$0	\$0	\$0	14Feb05	04Mar05	43d		1.3.3.11			
1.3.3.12	Demo Int. Stair Enclosure	\$3,580	\$0	\$3,580	07Mar05	09Mar05	43d		1.3.3.12			
1.3.4	Structural Steel & Weather Enclosures	\$241,956	\$0	\$241,956	14Feb05	29Aug05	11d		1.3.4			
1.3.4.1	S & A Steel Shop Drawings	\$0	\$0	\$0	14Feb05	11Mar05	11d		1.3.4.1			
1.3.4.2	Fab and ship Steel	\$0	\$0	\$0	14Mar05	22Apr05	11d		1.3.4.2			
1.3.4.3	Erect Structural Steel	\$65,774	\$0	\$65,774	25Apr05	06May05	11d		1.3.4.3			
1.3.4.4	Install Steel Stairs and misc.	\$42,019	\$0	\$42,019	04Jul05	07Jul05	11d		1.3.4.4			
1.3.4.5	Siding & Roofing	\$65,050	\$0	\$65,050	08Jul05	01Aug05	11d		1.3.4.5			
1.3.4.6	Electronics Bridge	\$69,111	\$0	\$69,111	02Aug05	29Aug05	11d		1.3.4.6			
1.3.5	Structural Concrete	\$108,566	\$0	\$108,566	14Feb05	01Jul05	11d		1.3.5			
1.3.5.1	S & A Rebar and Tendons.	\$0	\$0	\$0	14Feb05	14Mar05	36d		1.3.5.1			
1.3.5.2	Fab Rebar and Tendons	\$0	\$0	\$0	15Mar05	01Apr05	36d		1.3.5.2			
1.3.5.3	FBP Concrete @ El. 744'	\$54,283	\$0	\$54,283	09May05	03Jun05	11d		1.3.5.3			
1.3.5.4	FBP Concrete @ El 764'	\$54,283	\$0	\$54,283	06Jun05	01Jul05	11d		1.3.5.4			
1.3.6	Concrete Masonry	\$151,057	\$0	\$151,057	14Feb05	18Oct05	11d		1.3.6			
1.3.6.1	S & A Masonry SD	\$0	\$0	\$0	14Feb05	14Mar05	81d		1.3.6.1			
1.3.6.2	S & A Doors and Glass	\$0	\$0	\$0	15Mar05	12Apr05	81d		1.3.6.2			
1.3.6.3	Concrete Masonry EI 715-0	\$11,113	\$0	\$11,113	13Apr05	25Apr05	81d		1.3.6.3			

BTeV - WBS 3.0 C0 Building Outfitting
Total Construction Cost Profile (\$K) by Institution & Fiscal Year
Fermilab Labor: Salary, OPTO, Vacation, Fringe & Overhead
Non-Fermilab Labor: Salary, Benefits & Overhead
No Contingency, No Escalation, No Full material Procurement 'Burdening'

12Apr04



Activity ID	Activity Description	Materials & Services Costs	Labor Costs	Total Cost	Early Start	Early Finish	Float	FY04	FY05	FY06	FY07	FY08
1.3.6.4	Concrete Masonry EI 731'-4	\$16,670	\$0	\$16,670	04Jul05	22Jul05	37d					
1.3.6.5	Concrete Masonry EI 746-6	\$27,784	\$0	\$27,784	30Aug05	14Sep05	11d					
1.3.6.6	Concrete Masonry EI 755-4	\$27,784	\$0	\$27,784	15Sep05	27Sep05	11d					
1.3.6.7	Concrete Masonry EI 766-0	\$27,784	\$0	\$27,784	28Sep05	10Oct05	11d					
1.3.6.8	Install Doors and Glass	\$39,920	\$0	\$39,920	11Oct05	18Oct05	47d					
1.3.7	Conveying System	\$152,488	\$0	\$152,488	14Feb05	26Oct05	31d					
1.3.7.1	S & A Elevator SD	\$0	\$0	\$0	14Feb05	22Apr05	102d					
1.3.7.2	Fab and Del elev Rails	\$0	\$0	\$0	25Apr05	27May05	102d					
1.3.7.3	Install elev rails	\$28,400	\$0	\$28,400	30May05	10Jun05	102d					
1.3.7.4	Install Elevator Machine Rm	\$56,801	\$0	\$56,801	13Jun05	01Jul05	102d					
1.3.7.5	Demo Roof	\$1,185	\$0	\$1,185	04Jul05	05Jul05	90d					
1.3.7.6	Frame, Side & Roof Elevator Head house	\$9,301	\$0	\$9,301	06Jul05	19Jul05	90d					
1.3.7.7	Install Elevator Cab	\$56,801	\$0	\$56,801	11Oct05	24Oct05	31d					
1.3.7.8	Energize and Test Elevator	\$0	\$0	\$0	25Oct05	26Oct05	31d					
1.3.8	Finishes	\$76,724	\$0	\$76,724	11Oct05	29Nov05	25d					
1.3.8.1	Paint Block Walls	\$18,769	\$0	\$18,769	27Oct05	09Nov05	31d					
1.3.8.2	Paint Doors & Glass Frames	\$10,959	\$0	\$10,959	10Nov05	15Nov05	31d					
1.3.8.3	Rough In Toilet Rm Plumbing	\$23,498	\$0	\$23,498	11Oct05	24Oct05	25d					
1.3.8.4	Toilet RM Walls	\$0	\$0	\$0	25Oct05	02Nov05	25d					
1.3.8.5	Toilet Rm Finishes	\$0	\$0	\$0	03Nov05	23Nov05	25d					
1.3.8.6	Trim out Toilet Rm. Fixtures	\$23,498	\$0	\$23,498	24Nov05	29Nov05	25d					
1.3.14	Fire Protection	\$170,870	\$0	\$170,870	11Oct05	07Dec05	11d					
1.3.14.1	Install Fire Riser to High Bay	\$17,087	\$0	\$17,087	11Oct05	14Oct05	11d					
1.3.14.2	Install Fire Riser to Side bay	\$17,087	\$0	\$17,087	17Oct05	20Oct05	11d					
1.3.14.3	Rough In Sprinklers EI 731'-4"	\$17,087	\$0	\$17,087	21Oct05	27Oct05	11d					
1.3.14.4	Rough In sprinklers EI 746'-6	\$17,087	\$0	\$17,087	28Oct05	10Nov05	18d					
1.3.14.5	Rough In Sprinklers EI.755'-4	\$17,087	\$0	\$17,087	11Nov05	17Nov05	23d					
1.3.14.6	Rough In Sprinklers EI 766'-0	\$17,087	\$0	\$17,087	18Nov05	01Dec05	23d					
1.3.14.7	Trim Out Sprinklers EI 731'-4"	\$17,087	\$0	\$17,087	28Oct05	02Nov05	11d					
1.3.14.8	Trim Out sprinklers EI 746'-6	\$17,087	\$0	\$17,087	11Nov05	16Nov05	18d					
1.3.14.9	Trim Out Sprinklers EI.755'-4	\$17,087	\$0	\$17,087	18Nov05	23Nov05	23d					
1.3.14.10	Trim Out Sprinklers EI 766'-0	\$17,087	\$0	\$17,087	02Dec05	07Dec05	23d					
1.3.15	Fire Detection	\$98,783	\$0	\$98,783	03Nov05	28Sep06	1d					
1.3.15.1	Fire Detection EI 731'-4"	\$9,878	\$0	\$9,878	03Nov05	25Nov05	11d					
1.3.15.2	Fire Detection EI 746'-6	\$19,757	\$0	\$19,757	28Nov05	09Dec05	11d					
1.3.15.3	Fire Detection EI.755'-4	\$19,757	\$0	\$19,757	12Dec05	23Dec05	11d					
1.3.15.4	Fire Detection EI 766'-0	\$19,757	\$0	\$19,757	26Dec05	06Jan06	11d					
1.3.15.5	Upgrade Fire Control Panel	\$9,878	\$0	\$9,878	09Jan06	12Jan06	11d					
1.3.15.6	Test All Fire Detection	\$9,878	\$0	\$9,878	13Jan06	17Jan06	11d					

BTeV - WBS 3.0 C0 Building Outfitting
Total Construction Cost Profile (\$K) by Institution & Fiscal Year
Fermilab Labor: Salary, OPTO, Vacation, Fringe & Overhead
Non-Fermilab Labor: Salary, Benefits & Overhead
No Contingency, No Escalation, No Full material Procurement 'Burdening'

12Apr04

Planned

Critical

Late Dates

Milestone

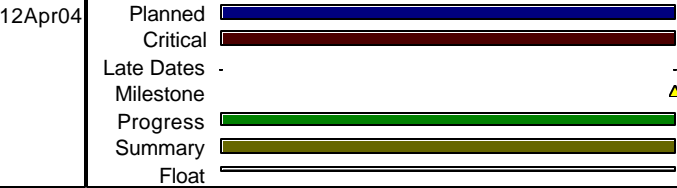
Progress

Summary

Float

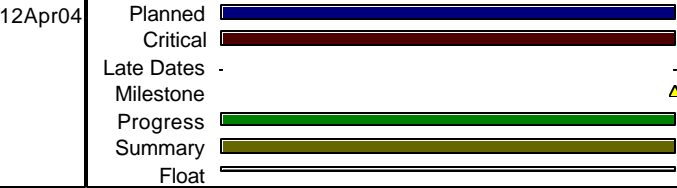
Activity ID	Activity Description	Materials & Services Costs	Labor Costs	Total Cost	Early Start	Early Finish	Float	FY04	FY05	FY06	FY07	FY08
1.3.15.7	Fire Detection Collision Hall	\$9,878	\$0	\$9,878	15Sep06	28Sep06	1d					
1.3.16	Power Distribution and Lighting	\$262,715	\$0	\$262,715	14Feb05	28Sep06	1d					
1.3.16.1	S & A Electrical Devices	\$0	\$0	\$0	14Feb05	17Jun05	56d					
1.3.16.2	Rough In House Power EI 715'-0	\$80,659	\$0	\$80,659	20Jun05	22Jul05	77d					
1.3.16.7	Coll Hall Power	\$91,439	\$0	\$91,439	08Sep06	28Sep06	1d					
1.3.16.8	Trim Out House Power EI 715'-0	\$80,659	\$0	\$80,659	25Jul05	19Aug05	77d					
1.3.16.13	Install Exist. 2000 Amp Switchbd	\$9,958	\$0	\$9,958	20Jun05	07Jul05	142d					
1.3.16.14	Pull and terminate secondary	\$0	\$0	\$0	08Jul05	15Jul05	142d					
1.3.18	Feeder From B-4 to C-0	\$434,278	\$0	\$434,278	20Jun05	15Nov05	25d					
1.3.18.1	Concrete and Rebar SD	\$0	\$0	\$0	20Jun05	18Jul05	56d					
1.3.18.2	Install Duct bank B-4 to Berm	\$42,838	\$0	\$42,838	19Jul05	27Jul05	56d					
1.3.18.3	Jack Carrier pipe thru berm	\$21,420	\$0	\$21,420	28Jul05	05Aug05	56d					
1.3.18.5	Install duct bank MH to C-0 Pad	\$42,838	\$0	\$42,838	08Aug05	25Aug05	56d					
1.3.18.6	Install secondary duct bank	\$149,908	\$0	\$149,908	26Aug05	07Sep05	56d					
1.3.18.7	Install Pad, C-0 Test Area	\$53,652	\$0	\$53,652	08Sep05	27Sep05	56d					
1.3.18.8	Install switch Pad at B-4	\$0	\$0	\$0	28Sep05	04Oct05	56d					
1.3.18.9	Set switch at B-4	\$2,400	\$0	\$2,400	03Nov05	03Nov05	56d					
1.3.18.10	Set Transformers C-0	\$25,200	\$0	\$25,200	04Nov05	08Nov05	56d					
1.3.18.11	Set Switch C-0 Test	\$2,400	\$0	\$2,400	09Nov05	09Nov05	56d					
1.3.18.12	Set Generator C-0 Test	\$75,531	\$0	\$75,531	10Nov05	10Nov05	58d					
1.3.18.14	Pull Feeder B-4 to C-0 Test Area	\$0	\$0	\$0	10Nov05	14Nov05	56d					
1.3.18.15	Terminate Primary	\$0	\$0	\$0	15Nov05	15Nov05	56d					
1.3.18.16	Rerack Main Ring Manholes	\$18,091	\$0	\$18,091	08Aug05	26Aug05	25d					
2	C-0 Outfitting Phase 2	\$1,859,031	\$444,071	\$2,303,102	03Apr06	14Sep07	0					
2.1	Design to Award C-0 Phase 2	\$46,400	\$187,185	\$233,585	03Apr06	08Dec06	0					
2.1.1	Title II EDIA FESS	\$0	\$187,185	\$187,185	03Apr06	09Jun06	35d					
2.1.2	Title II EDIA Consultant	\$46,400	\$0	\$46,400	19Jun06	11Aug06	35d					
2.1.3	Construction Req.	\$0	\$0	\$0	02Oct06	06Oct06	0					
2.1.4	Release for Bid	\$0	\$0	\$0	09Oct06	13Oct06	0					
2.1.5	Pre- Bid Meeting	\$0	\$0	\$0	09Oct06	09Oct06	4d					
2.1.6	Establish Source Criteria	\$0	\$0	\$0	16Oct06	18Oct06	0					
2.1.7	Receive Proposals	\$0	\$0	\$0	16Oct06	17Nov06	0					
2.1.8	Source Selection& Award	\$0	\$0	\$0	20Nov06	08Dec06	0					
2.2	Title 3 EDIA C-0 Outfitting Phase 2	\$0	\$256,885	\$256,885	11Dec06	11Dec06	53d					
2.3	C-0 Outfitting Phase 2 Construction Contract	\$1,812,631	\$0	\$1,812,631	11Dec06	14Sep07	0					
2.3.1	Notice to Proceed	\$0	\$0	\$0	11Dec06	11Dec06	0					

BTeV - WBS 3.0 C0 Building Outfitting
Total Construction Cost Profile (\$K) by Institution & Fiscal Year
Fermilab Labor: Salary, OPTO, Vacation, Fringe & Overhead
Non-Fermilab Labor: Salary, Benefits & Overhead
No Contingency, No Escalation, No Full material Procurement 'Burdening'



Activity ID	Activity Description	Materials & Services Costs	Labor Costs	Total Cost	Early Start	Early Finish	Float	FY04	FY05	FY06	FY07	FY08
2.3.2	Mobilize	\$0	\$0	\$0	11Dec06	11Dec06	0				2.3.2	
2.3.3	Site Concrete	\$114,016	\$0	\$114,016	11Dec06	20Feb07	92d				2.3.3	
2.3.3.4	FBP Chiller Pads	\$34,376	\$0	\$34,376	11Dec06	15Dec06	92d				2.3.3.4	
2.3.3.5	FBP Condenser Pads	\$51,565	\$0	\$51,565	18Dec06	26Dec06	92d				2.3.3.5	
2.3.3.6	Construct Gas House	\$28,074	\$0	\$28,074	05Feb07	20Feb07	189d				2.3.3.6	
2.3.6	Masonry	\$50,689	\$0	\$50,689	11Dec06	31Jan07	131d				2.3.6	
2.3.6.1	S & A Finishes	\$0	\$0	\$0	11Dec06	08Jan07	131d				2.3.6.1	
2.3.6.9	C-0 Service Bldg. Mods	\$11,728	\$0	\$11,728	09Jan07	17Jan07	159d				2.3.6.9	
2.3.6.10	C-0 SB Buss Duct Enclosure	\$38,960	\$0	\$38,960	18Jan07	31Jan07	159d				2.3.6.10	
2.3.8	Finishes	\$221,492	\$0	\$221,492	15May07	14Sep07	41d				2.3.8	
2.3.8.2	Fab and Deliver Finishes	\$0	\$0	\$0	17Jul07	10Sep07	41d				2.3.8.2	
2.3.8.7	Flooring & Carpeting EI 755'-4	\$16,536	\$0	\$16,536	11Sep07	14Sep07	41d				2.3.8.7	
2.3.8.8	Install Computer Floor EI 746'-6	\$72,842	\$0	\$72,842	15May07	28May07	41d				2.3.8.8	
2.3.8.9	Install Computer Floor EI. 766'-0	\$72,842	\$0	\$72,842	29May07	11Jun07	41d				2.3.8.9	
2.3.8.10	C-0 Service Bldg. Mods	\$59,271	\$0	\$59,271	12Jun07	16Jul07	41d				2.3.8.10	
2.3.9	HVAC System	\$475,946	\$0	\$475,946	11Dec06	30Aug07	37d				2.3.9	
2.3.9.1	S & A HVAC Units	\$0	\$0	\$0	11Dec06	08Jan07	123d				2.3.9.1	
2.3.9.2	F & D HVAC Units	\$0	\$0	\$0	09Jan07	19Feb07	123d				2.3.9.2	
2.3.9.3	Install HVAC Units Coll. Hall & Assem Hall	\$80,212	\$0	\$80,212	20Feb07	12Mar07	123d				2.3.9.3	
2.3.9.4	Install HVAC Units + Off & MUA	\$34,913	\$0	\$34,913	13Mar07	26Mar07	165d				2.3.9.4	
2.3.9.5	Collision Hall work, (Duct, fancoil, Piping	\$37,241	\$0	\$37,241	06Aug07	08Aug07	37d				2.3.9.5	
2.3.9.6	Duct Work	\$77,068	\$0	\$77,068	13Mar07	20Mar07	123d				2.3.9.6	
2.3.9.7	Install Ductwk EI 755'-4"	\$11,458	\$0	\$11,458	21Mar07	10Apr07	123d				2.3.9.7	
2.3.9.8	Install Motorized Dampers and Louvers	\$14,323	\$0	\$14,323	11Apr07	17Apr07	123d				2.3.9.8	
2.3.9.9	Comm. and Training HVAC	\$18,522	\$0	\$18,522	13Aug07	13Aug07	65d				2.3.9.9	
2.3.9.10	Insulate Ductwork	\$37,044	\$0	\$37,044	18Apr07	23Apr07	123d				2.3.9.10	
2.3.9.11	Install Toilet Room Exhaust	\$3,704	\$0	\$3,704	24Apr07	25Apr07	123d				2.3.9.11	
2.3.9.12	Install Mech Rom Exhaust	\$6,174	\$0	\$6,174	26Apr07	27Apr07	123d				2.3.9.12	
2.3.9.13	Install DCW pipe and Humidifier	\$14,818	\$0	\$14,818	30Apr07	01May07	123d				2.3.9.13	
2.3.9.14	Balance HVAC System, Assy, Off & MUA	\$5,704	\$0	\$5,704	02May07	03May07	123d				2.3.9.14	
2.3.9.15	Balance HVAC Sys. Col Hall	\$2,444	\$0	\$2,444	15Aug07	16Aug07	52d				2.3.9.15	
2.3.9.16	Install Sensors and Controls	\$58,344	\$0	\$58,344	04May07	10May07	132d				2.3.9.16	
2.3.9.17	Start Up and Comm (Non Shutdownn Related)	\$19,244	\$0	\$19,244	04May07	09May07	123d				2.3.9.17	
2.3.9.18	Start Up and Comm (Shutdown Related)	\$19,244	\$0	\$19,244	17Aug07	30Aug07	52d				2.3.9.18	
2.3.9.19	Install Bridge HVAC Unit Piping and Startup	\$12,348	\$0	\$12,348	24Apr07	27Apr07	141d				2.3.9.19	

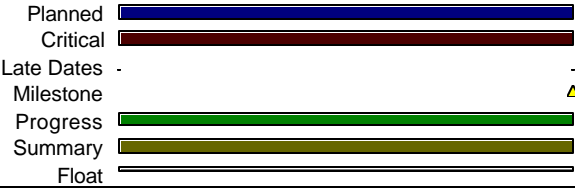
BTeV - WBS 3.0 C0 Building Outfitting
Total Construction Cost Profile (\$K) by Institution & Fiscal Year
Fermilab Labor: Salary, OPTO, Vacation, Fringe & Overhead
Non-Fermilab Labor: Salary, Benefits & Overhead
No Contingency, No Escalation, No Full material Procurement 'Burdening'



Activity ID	Activity Description	Materials & Services Costs	Labor Costs	Total Cost	Early Start	Early Finish	Float	FY04				FY05				FY06				FY07				FY08
2.3.9.20	Install CRAC Condensing Unit AC for EI 746	\$16,719	\$0	\$16,719	29May07	05Jun07	100d																	
2.3.9.21	Install Ref Piping Test, Fill and Charge Ins and Startup	\$6,419	\$0	\$6,419	06Jun07	11Jun07	100d																	
2.3.10	Chilled Water System (CHW)	\$281,095	\$0	\$281,095	11Dec06	21Aug07	59d																	
2.3.10.1	S & A Chillers, W/ Controls	\$0	\$0	\$0	11Dec06	08Jan07	59d																	
2.3.10.2	F & D Chillers W/ Controls	\$0	\$0	\$0	09Jan07	19Mar07	59d																	
2.3.10.3	S & A Chilled Water Pumps	\$0	\$0	\$0	20Mar07	17Apr07	59d																	
2.3.10.4	F & D Chilled Water Pumps	\$0	\$0	\$0	18Apr07	06Jun07	59d																	
2.3.10.5	Install Chillers	\$110,416	\$0	\$110,416	18Apr07	20Apr07	97d																	
2.3.10.6	Install Chilled Water Pumps	\$4,229	\$0	\$4,229	07Jun07	13Jun07	59d																	
2.3.10.7	Install CHW piping supports and Fittings	\$43,909	\$0	\$43,909	14Jun07	27Jun07	59d																	
2.3.10.8	Install Tanks and Othere Hydronic items	\$11,082	\$0	\$11,082	28Jun07	11Jul07	59d																	
2.3.10.9	Install ECW pipe header on 756 Comp Rm.	\$17,100	\$0	\$17,100	12Jul07	19Jul07	59d																	
2.3.10.10	Leak test and Insulate ECW Header	\$5,700	\$0	\$5,700	20Jul07	25Jul07	59d																	
2.3.10.11	Leak test & Insulate CHW	\$9,567	\$0	\$9,567	26Jul07	02Aug07	59d																	
2.3.10.12	Install Sensors and Controls	\$49,593	\$0	\$49,593	03Aug07	10Aug07	59d																	
2.3.10.13	Flush tag and Fill System	\$3,704	\$0	\$3,704	13Aug07	13Aug07	59d																	
2.3.10.14	Startup & Bal CHW	\$3,257	\$0	\$3,257	14Aug07	14Aug07	59d																	
2.3.10.15	Comm and Training	\$22,538	\$0	\$22,538	15Aug07	21Aug07	59d																	
2.3.11	High Density Computer Cooling	\$235,183	\$0	\$235,183	11Dec06	10Apr07	44d																	
2.3.11.1	S & A Computer Rm. Air Handlers	\$0	\$0	\$0	11Dec06	08Jan07	53d																	
2.3.11.2	F & D Computer Room Air handlers	\$0	\$0	\$0	09Jan07	19Feb07	53d																	
2.3.11.3	Install Comp. Rm Condensers pad mnt.	\$81,497	\$0	\$81,497	20Feb07	07Mar07	53d																	
2.3.11.4	Install Comp room Air handlers EI; 766	\$93,143	\$0	\$93,143	20Feb07	07Mar07	53d																	
2.3.11.5	Ref. Piping CRAC	\$14,818	\$0	\$14,818	20Feb07	01Mar07	57d																	
2.3.11.6	Leak Test and Charge Ref Piping	\$3,754	\$0	\$3,754	08Mar07	13Mar07	53d																	
2.3.11.7	Install DCW & Humidifier	\$11,113	\$0	\$11,113	14Mar07	15Mar07	53d																	
2.3.11.8	Insulate and Tag Piping	\$14,510	\$0	\$14,510	16Mar07	20Mar07	53d																	
2.3.11.9	Install Controls	\$12,965	\$0	\$12,965	03Apr07	06Apr07	44d																	
2.3.11.10	Startup Balance Comm and Training	\$3,383	\$0	\$3,383	09Apr07	10Apr07	44d																	
2.3.12	746'-6 Computer Room Cooling	\$0	\$0	\$0	11Dec06	05Jun07	113d																	
2.3.12.1	S & A Computer Room Heat Exchanger	\$0	\$0	\$0	11Dec06	08Jan07	143d																	
2.3.12.2	F & D HeatExger + 8 Pumps	\$0	\$0	\$0	09Jan07	19Feb07	143d																	

BTeV - WBS 3.0 C0 Building Outfitting
Total Construction Cost Profile (\$K) by Institution & Fiscal Year
Fermilab Labor: Salary, OPTO, Vacation, Fringe & Overhead
Non-Fermilab Labor: Salary, Benefits & Overhead
No Contingency, No Escalation, No Full material Procurement 'Burdening'

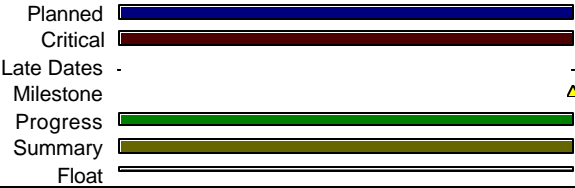
12Apr04



Activity ID	Activity Description	Materials & Services Costs	Labor Costs	Total Cost	Early Start	Early Finish	Float	FY04				FY05				FY06				FY07				FY08
2.3.12.3	Install HeatExger	\$0	\$0	\$0	03Apr07	16Apr07	113d													2.3.12.3				
2.3.12.4	Install Piping EI 746'-6 System	\$0	\$0	\$0	17Apr07	28May07	113d													2.3.12.4				
2.3.12.6	Test and Balance EI 746	\$0	\$0	\$0	29May07	04Jun07	113d													2.3.12.6				
2.3.12.7	Commissioning and Training EI 746	\$0	\$0	\$0	05Jun07	05Jun07	113d													2.3.12.7				
2.3.13	Motor Control Center (MCC)	\$32,863	\$0	\$32,863	11Dec06	02Apr07	44d													2.3.13				
2.3.13.1	S & A MCC	\$0	\$0	\$0	11Dec06	08Jan07	44d													2.3.13.1				
2.3.13.2	F & D Motor Control Center	\$0	\$0	\$0	09Jan07	19Feb07	44d													2.3.13.2				
2.3.13.3	Install Motor Control Center	\$32,863	\$0	\$32,863	20Feb07	02Apr07	44d													2.3.13.3				
2.3.16	Power Distribution and Lighting	\$217,270	\$0	\$217,270	11Dec06	25Jun07	0													2.3.16				
2.3.16.1	S & A Material Submittals	\$0	\$0	\$0	11Dec06	08Jan07	0													2.3.16.1				
2.3.16.2	Fab and Del.	\$0	\$0	\$0	09Jan07	12Mar07	0													2.3.16.2				
2.3.16.3	Rough In Power & Lighting EI 731	\$45,322	\$0	\$45,322	13Mar07	09Apr07	0													2.3.16.3				
2.3.16.4	Rough In Power & Lighting EI 746'-6	\$11,114	\$0	\$11,114	10Apr07	30Apr07	0													2.3.16.4				
2.3.16.5	Rough In Power & Lighting EI. 755'-4	\$24,977	\$0	\$24,977	01May07	21May07	0													2.3.16.5				
2.3.16.6	Rough In Power & Lighting EI 766'-0	\$27,222	\$0	\$27,222	22May07	11Jun07	0													2.3.16.6				
2.3.16.9	Trim Out House Power EI 731'-0	\$45,322	\$0	\$45,322	22May07	04Jun07	115d													2.3.16.9				
2.3.16.10	Trim Out Power & Lighting EI 746'-6	\$11,114	\$0	\$11,114	01May07	14May07	41d													2.3.16.10				
2.3.16.11	Trim Out Power & Lighting EI. 755'-4	\$24,977	\$0	\$24,977	22May07	04Jun07	5d													2.3.16.11				
2.3.16.12	Trim Out Power & Lighting EI 766'-0	\$27,222	\$0	\$27,222	12Jun07	25Jun07	0													2.3.16.12				
2.3.17	Side Bay Computer Power	\$184,075	\$0	\$184,075	26Jun07	07Sep07	0													2.3.17				
2.3.17.1	Install User Panels EI 746'-6	\$73,474	\$0	\$73,474	26Jun07	05Jul07	0													2.3.17.1				
2.3.17.3	Install User Panels EI. 766'-0	\$110,601	\$0	\$110,601	06Jul07	16Aug07	0													2.3.17.3				
2.3.17.4	Punch List	\$0	\$0	\$0	17Aug07	31Aug07	0													2.3.17.4				
2.3.17.5	Commision Coll. Hall	\$0	\$0	\$0	03Sep07	07Sep07	0													2.3.17.5				
3	C Sector High Voltage Power Upgrade	\$599,249	\$175,470	\$774,720	03Oct05	10Oct06	19d													3				
3.1	Design to Award C Sector High Voltage	\$62,060	\$25,452	\$87,512	03Oct05	03Feb06	19d													3.1				
3.1.1	Title II EDIA FESS Engineering	\$0	\$25,452	\$25,452	03Oct05	25Nov05	19d													3.1.1				
3.1.2	Title II EDIA Consultant Eng.	\$62,060	\$0	\$62,060	03Oct05	25Nov05	19d													3.1.2				
3.1.3	Construction Req.	\$0	\$0	\$0	28Nov05	09Dec05	19d													3.1.3				
3.1.4	Release for Bid	\$0	\$0	\$0	12Dec05	23Dec05	19d													3.1.4				
3.1.5	Pre- Bid Meeting	\$0	\$0	\$0	09Jan06	09Jan06	36d													3.1.5				
3.1.6	Establish Source Criteria	\$0	\$0	\$0	10Jan06	11Jan06	36d													3.1.6				
3.1.7	Receive Proposals	\$0	\$0	\$0	26Dec05	20Jan06	19d													3.1.7				

BTeV - WBS 3.0 C0 Building Outfitting
Total Construction Cost Profile (\$K) by Institution & Fiscal Year
Fermilab Labor: Salary, OPTO, Vacation, Fringe & Overhead
Non-Fermilab Labor: Salary, Benefits & Overhead
No Contingency, No Escalation, No Full material Procurement 'Burdening'

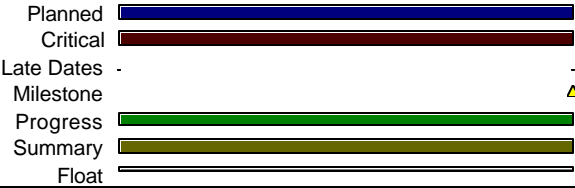
12Apr04



Activity ID	Activity Description	Materials & Services Costs	Labor Costs	Total Cost	Early Start	Early Finish	Float	FY04	FY05	FY06	FY07	FY08
3.1.8	Source Selection and Award	\$0	\$0	\$0	23Jan06	03Feb06	19d			3.1.8		
3.2	Title 3 EDIA C Sector High Voltage	\$0	\$150,018	\$150,018	23Jan06	30Aug06	72d			3.2		
3.3	C Sector high voltage Const. Contract	\$537,189	\$0	\$537,189	22May06	10Oct06	19d			3.3		
3.3.1	Notice to Proceed	\$0	\$0	\$0	22May06	22May06	19d			3.3.1		
3.3.2	Mobolize	\$0	\$0	\$0	23May06	12Jun06	19d			3.3.2		
3.3.3	KRS to B-4	\$295,534	\$0	\$295,534	13Jun06	01Sep06	19d			3.3.3		
3.3.3.1	Install Switch in KRS	\$38,253	\$0	\$38,253	13Jun06	15Jun06	19d			3.3.3.1		
3.3.3.2	Pull Cable KRS to E2	\$38,253	\$0	\$38,253	16Jun06	29Jun06	19d			3.3.3.2		
3.3.3.3	Pull Cable E2 to E-0	\$38,253	\$0	\$38,253	30Jun06	06Jul06	19d			3.3.3.3		
3.3.3.4	Pull Cable E-0 to C-2	\$38,253	\$0	\$38,253	07Jul06	12Jul06	19d			3.3.3.4		
3.3.3.5	Pull Cable C-2 to C-0	\$23,753	\$0	\$23,753	13Jul06	17Jul06	19d			3.3.3.5		
3.3.3.6	Pull Cable C-0 to B-4	\$23,753	\$0	\$23,753	18Jul06	19Jul06	19d			3.3.3.6		
3.3.3.7	Fire wrap E-2, E-0, D-2	\$23,753	\$0	\$23,753	20Jul06	08Aug06	19d			3.3.3.7		
3.3.3.8	Fire wrap C-4, C-2, B-4	\$23,753	\$0	\$23,753	09Aug06	24Aug06	19d			3.3.3.8		
3.3.3.9	Terminate in 4 way switch	\$23,753	\$0	\$23,753	25Aug06	28Aug06	70d			3.3.3.9		
3.3.3.10	Splice to Feeder 49	\$11,877	\$0	\$11,877	29Aug06	30Aug06	70d			3.3.3.10		
3.3.3.11	Test Cables	\$11,877	\$0	\$11,877	31Aug06	01Sep06	70d			3.3.3.11		
3.3.4	IR Primary Power	\$241,654	\$0	\$241,654	13Jun06	10Oct06	19d			3.3.4		
3.3.4.1	Install Duct Bank B-4	\$44,117	\$0	\$44,117	13Jun06	26Jun06	33d			3.3.4.1		
3.3.4.2	Install Duct Bank C-0	\$66,604	\$0	\$66,604	27Jun06	10Jul06	33d			3.3.4.2		
3.3.4.3	Install Duct Bank C-1	\$35,439	\$0	\$35,439	11Jul06	24Jul06	37d			3.3.4.3		
3.3.4.4	Install Transformer Pad B-4	\$11,458	\$0	\$11,458	27Jun06	03Jul06	38d			3.3.4.4		
3.3.4.5	Install Transformer Pad C-0	\$31,512	\$0	\$31,512	11Jul06	28Jul06	33d			3.3.4.5		
3.3.4.6	Install Transformer Pad C-1	\$11,458	\$0	\$11,458	31Jul06	04Aug06	33d			3.3.4.6		
3.3.4.7	Install Transformer B-4	\$6,960	\$0	\$6,960	02Aug06	07Aug06	59d			3.3.4.7		
3.3.4.8	Install Transformer C-0	\$13,920	\$0	\$13,920	29Aug06	01Sep06	44d			3.3.4.8		
3.3.4.9	Install Transformer C-1	\$6,960	\$0	\$6,960	05Sep06	08Sep06	43d			3.3.4.9		
3.3.4.10	Install Panel boards	\$13,224	\$0	\$13,224	27Jun06	24Jul06	77d			3.3.4.10		
3.3.4.11	Pull 13.8 KV Primary, splice and wrap B-4	\$0	\$0	\$0	25Aug06	04Sep06	19d			3.3.4.11		
3.3.4.12	Pull 13.8 KV Primary, splice and wrap C-0	\$0	\$0	\$0	25Aug06	04Sep06	19d			3.3.4.12		
3.3.4.13	Pull 13.8 KV Primary, splice and wrap C-1	\$0	\$0	\$0	25Aug06	04Sep06	19d			3.3.4.13		
3.3.4.14	Pull and terminate secondary	\$0	\$0	\$0	11Sep06	15Sep06	43d			3.3.4.14		
3.3.4.15	Clean Transformers	\$0	\$0	\$0	18Sep06	20Sep06	43d			3.3.4.15		
3.3.4.16	Testing	\$0	\$0	\$0	21Sep06	25Sep06	43d			3.3.4.16		
3.3.4.17	Punch List	\$0	\$0	\$0	26Sep06	09Oct06	43d			3.3.4.17		
3.3.4.18	C Sector H V Complete	\$0	\$0	\$0	10Oct06	10Oct06	43d			3.3.4.18		
4	Pre Procured Items	\$625,337	\$38,347	\$663,684	26Nov04	11May06	44d		4			

BTeV - WBS 3.0 C0 Building Outfitting
Total Construction Cost Profile (\$K) by Institution & Fiscal Year
Fermilab Labor: Salary, OPTO, Vacation, Fringe & Overhead
Non-Fermilab Labor: Salary, Benefits & Overhead
No Contingency, No Escalation, No Full material Procurement 'Burdening'

12Apr04



Activity ID	Activity Description	Materials & Services Costs	Labor Costs	Total Cost	Early Start	Early Finish	Float	FY04	FY05	FY06	FY07	FY08
4.1	Procure Item EDIA FESS	\$0	\$38,347	\$38,347	26Nov04	24Dec04	93d		4.1			
4.2	Write procured item specs	\$0	\$0	\$0	27Dec04	04Feb05	93d		4.2			
4.3	Bid and award cable	\$0	\$0	\$0	07Feb05	05Apr05	93d		4.3			
4.4	Phase 1 Cable Procure and delivery	\$16,441	\$0	\$16,441	06Apr05	19Sep05	93d		4.4			
4.5	C Sector Cable procure and delivery	\$246,617	\$0	\$246,617	28Nov05	11May06	44d			4.5		
4.6	Bid and award transformers	\$0	\$0	\$0	07Feb05	05Apr05	103d		4.6			
4.7	Phase 1 Transformer Procure and Deliver	\$61,480	\$0	\$61,480	06Apr05	30Aug05	103d		4.7			
4.8	C SectorTrans. procure and delivery	\$242,440	\$0	\$242,440	28Nov05	21Apr06	131d			4.8		
4.9	Bid and award Air switch	\$0	\$0	\$0	07Feb05	05Apr05	132d		4.9			
4.10	Phase 1 4-Bay Switch Procure and Delivery	\$29,179	\$0	\$29,179	06Apr05	19Jul05	132d		4.10			
4.11	C Sector 4-Bay Switch procure and delivery	\$29,178	\$0	\$29,178	28Nov05	10Mar06	161d			4.11		
5	Milestones	\$0	\$0	\$0	01Oct04	12Nov07	0		5			
5.1	Lev2Mil: MS-1 Start Engineering	\$0	\$0	\$0	01Oct04	01Oct04	1d		5.1			
5.2	Lev1Mil: MS-2 Start Construction	\$0	\$0	\$0	28Jan05	28Jan05	12d		5.2			
5.3	Lev3Mil: MS-3 Side Bay. Struct. Complete	\$0	\$0	\$0	26Oct05	26Oct05	41d			5.3		
5.4	Lev3Mil: MS-4 Temo Power Operational (Fdr 45)	\$0	\$0	\$0	15Nov05	15Nov05	56d			5.4		
5.5	Lev1Mil: MS-5 Beneficial occupancy of lower level and upper staging area	\$0	\$0	\$0	17Jan06	17Jan06	11d			5.5		
5.6	Lev1Mil: MS-6 Collision Hall Complete	\$0	\$0	\$0	07Sep07	07Sep07	46d				5.6	
5.7	Lev3Mil: MS-7 Mechancal Systems Complete (Except CH)	\$0	\$0	\$0	21Aug07	21Aug07	59d				5.7	
5.8	Lev3Mil: MS-8 Electrical Systems Complete	\$0	\$0	\$0	16Aug07	16Aug07	62d				5.8	
5.9	Lev1Mil: MS-9 Assembly, Service Building Construction Complete	\$0	\$0	\$0	07Sep07	07Sep07	0				5.9	
5.10	Lev2Mil: MS-10 Engineering Complete	\$0	\$0	\$0	12Nov07	12Nov07	0					5.10
5.12	Level 1 & Inter-Subproject Link Milestones	\$0	\$0	\$0	01Oct04	28Sep07	1d		5.12			
5.12.2	Construction Phase Milestones	\$0	\$0	\$0	01Oct04	28Sep07	1d		5.12.2			
5.12.2.1	Lnk1Mil: Start Construction Phase	\$0	\$0	\$0	01Oct04	01Oct04	1d		5.12.2.1			
5.12.2.2	Lnk1Mil: Begin FY05 Shutdown	\$0	\$0	\$0	08Aug05	08Aug05	1d			5.12.2.2		
5.12.2.3	Lnk1Mil: End FY05 Shutdown	\$0	\$0	\$0	30Sep05	30Sep05	1d			5.12.2.3		

BTeV - WBS 3.0 C0 Building Outfitting

Total Construction Cost Profile (\$K) by Institution & Fiscal Year

Fermilab Labor: Salary, OPTO, Vacation, Fringe & Overhead

Non-Fermilab Labor: Salary, Benefits & Overhead

No Contingency, No Escalation, No Full material Procurement 'Burdening'

12Apr04

Planned

Critical

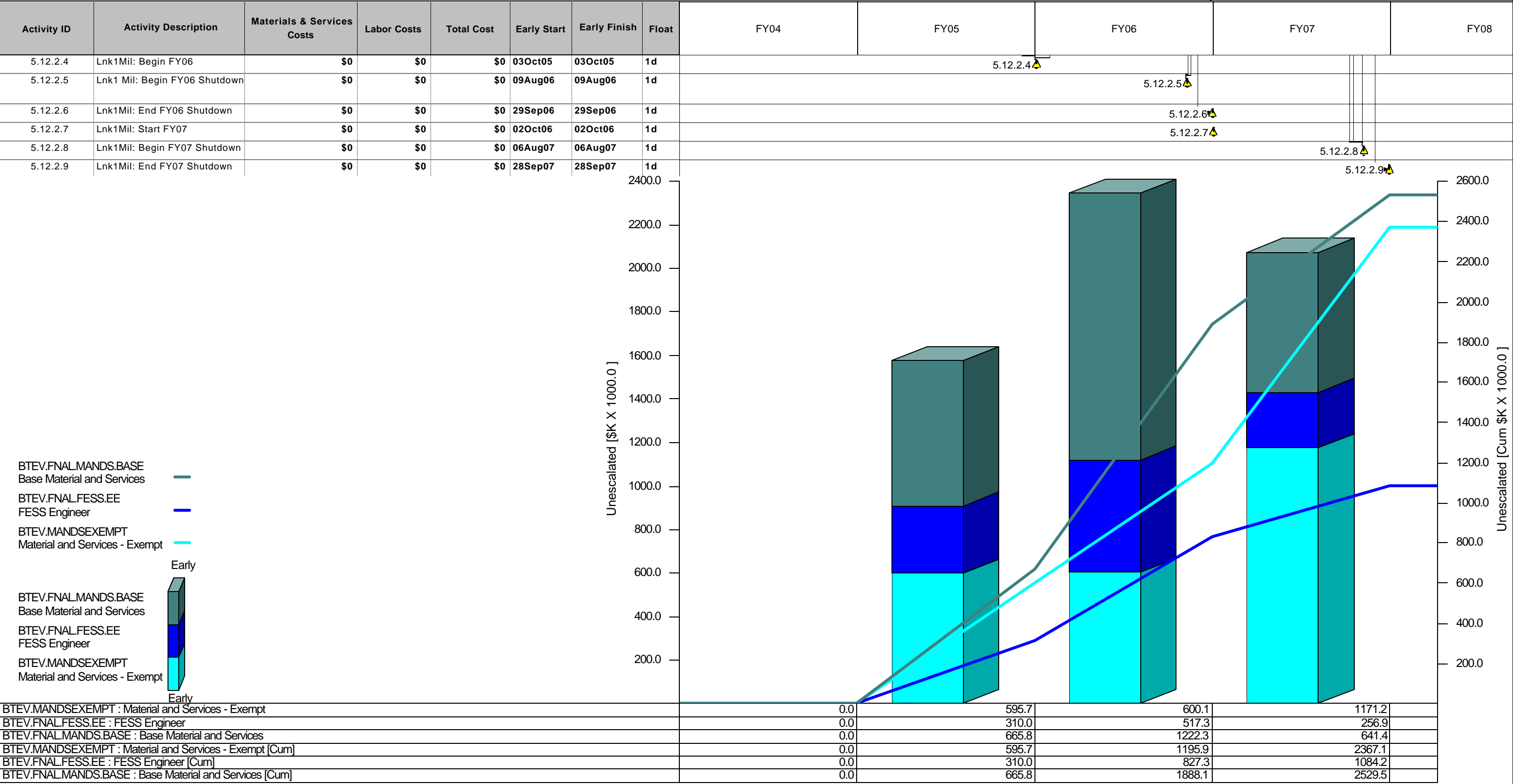
Late Dates -

Milestone

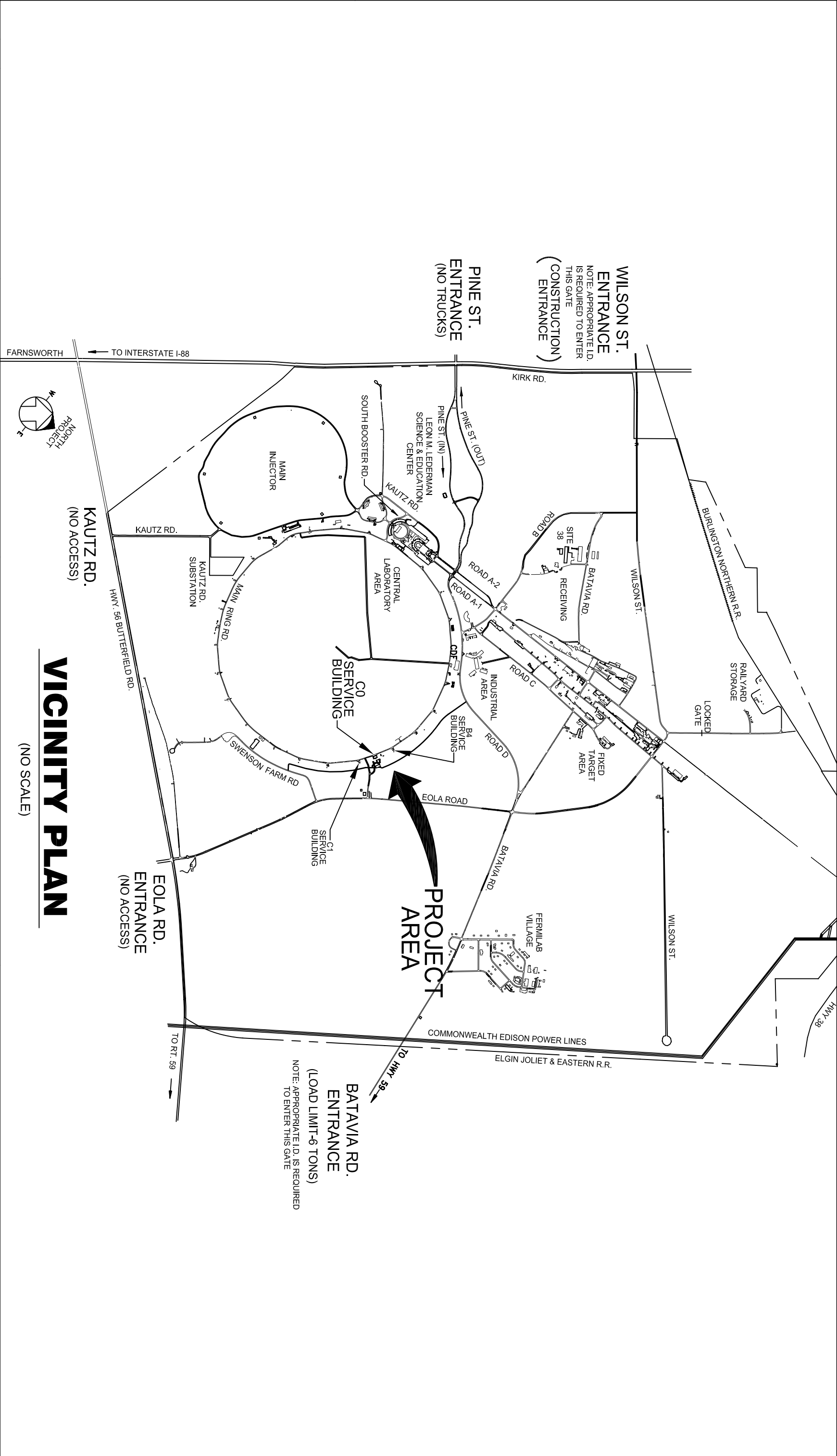
Progress

Summary

Float




REV.	DATE	DESCRIPTIONS	
		REVISIONS	
		DESIGNED	
		DRAWN	
		CHECKED	
		APPROVED	
		SUBMITTED	



SCALE:

VICINITY PLAN



FERMI NATIONAL ACCELERATOR LABORATORY

UNITED STATES DEPARTMENT OF ENERGY

C-0 OUTFITTING

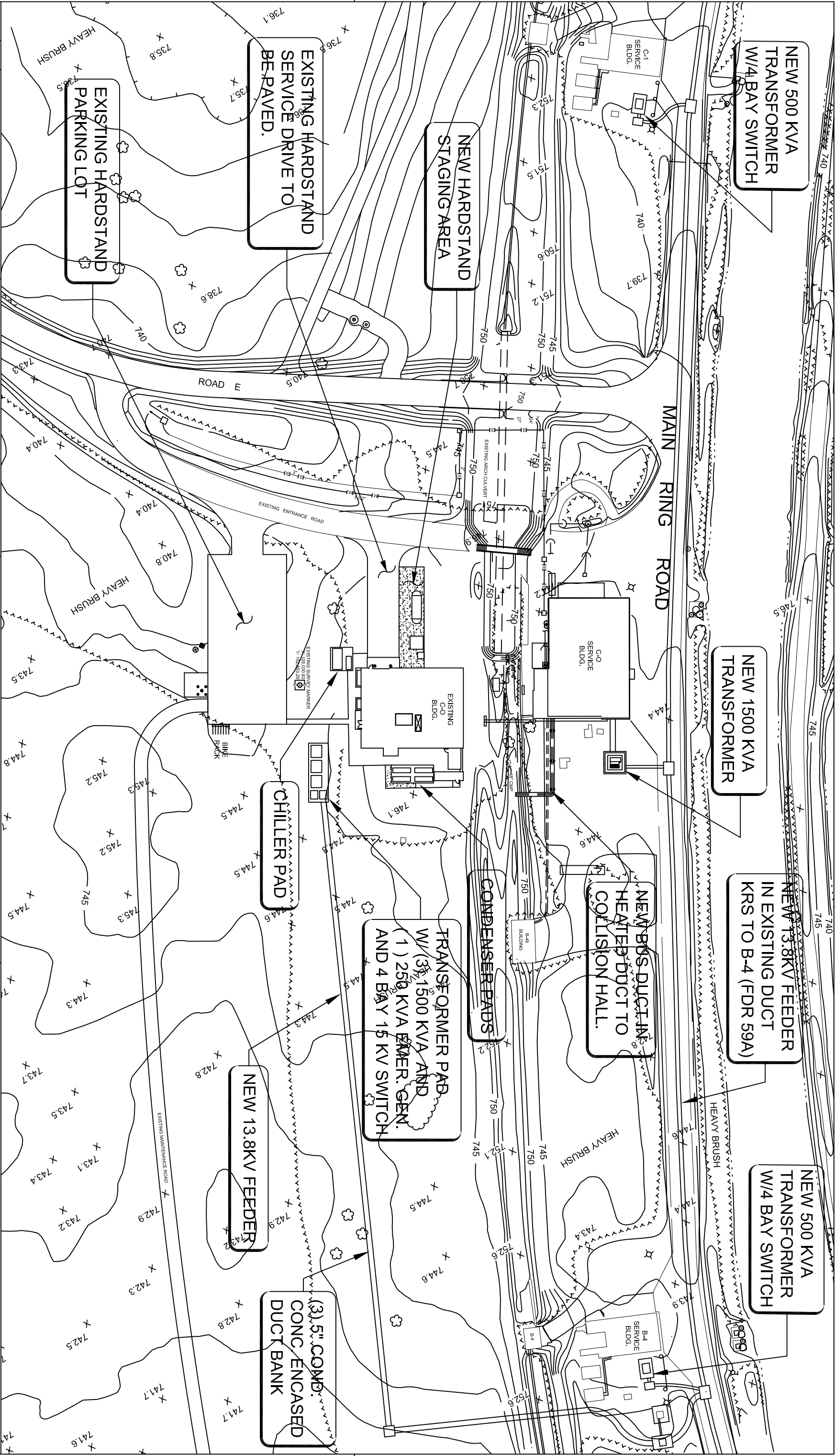
VICINITY PLAN

DRAWING NO. 6-8-3

CD-1 REVIEW

C-1

REV.



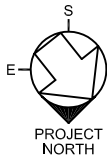
		NAME		DATE
		DESIGNED		
		DRAWN		
		CHECKED		
		APPROVED		
		SUBMITTED		
REV.	DATE	DESCRIPTIONS REVISIONS		


SCALE: 1" = 70'-0"

70 0 70 140

SCALE

FEET





DRAWING NO.

6-8-3

CD-1 REVIEW

C-2

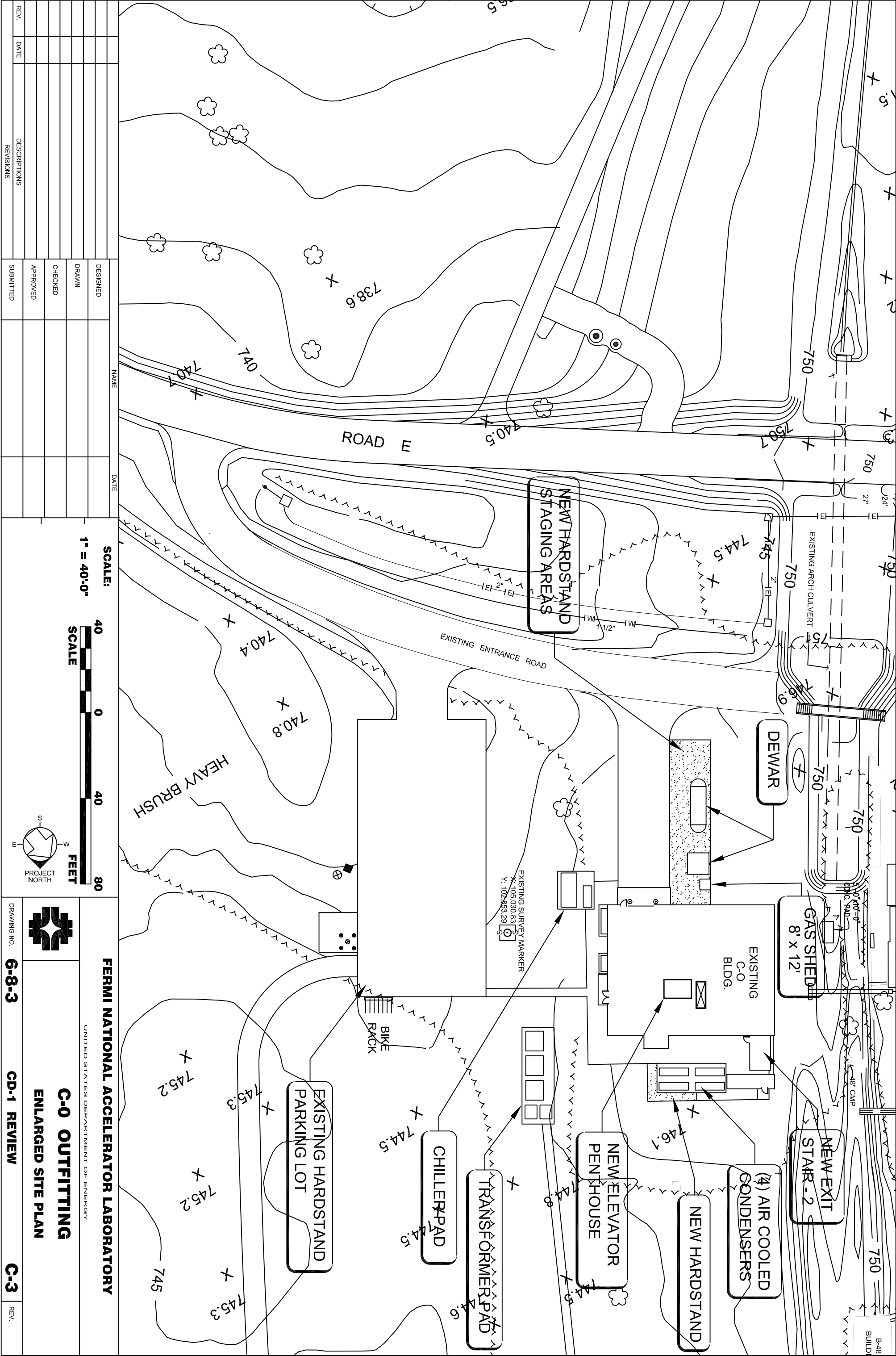
REV.

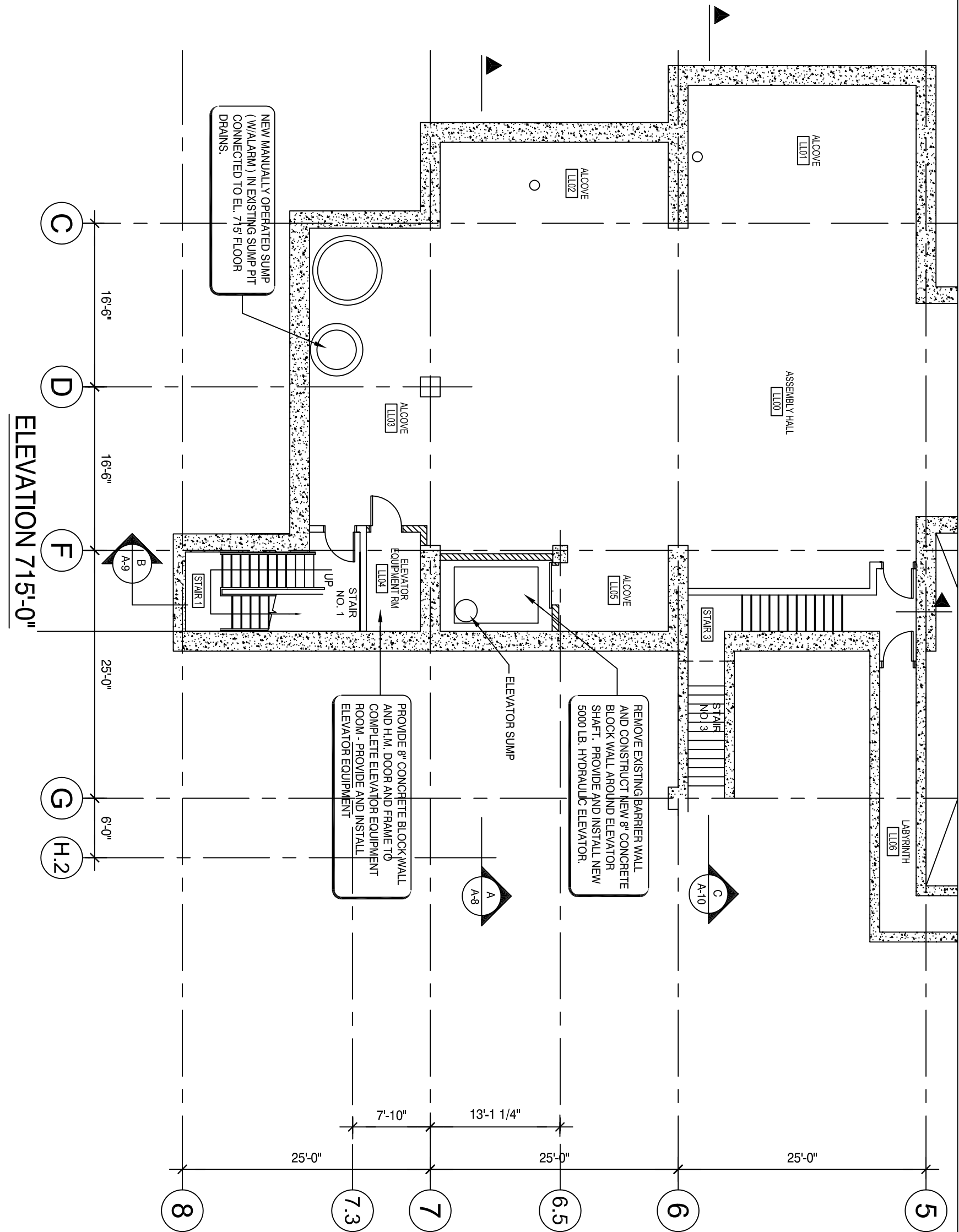
FERMI NATIONAL ACCELERATOR LABORATORY

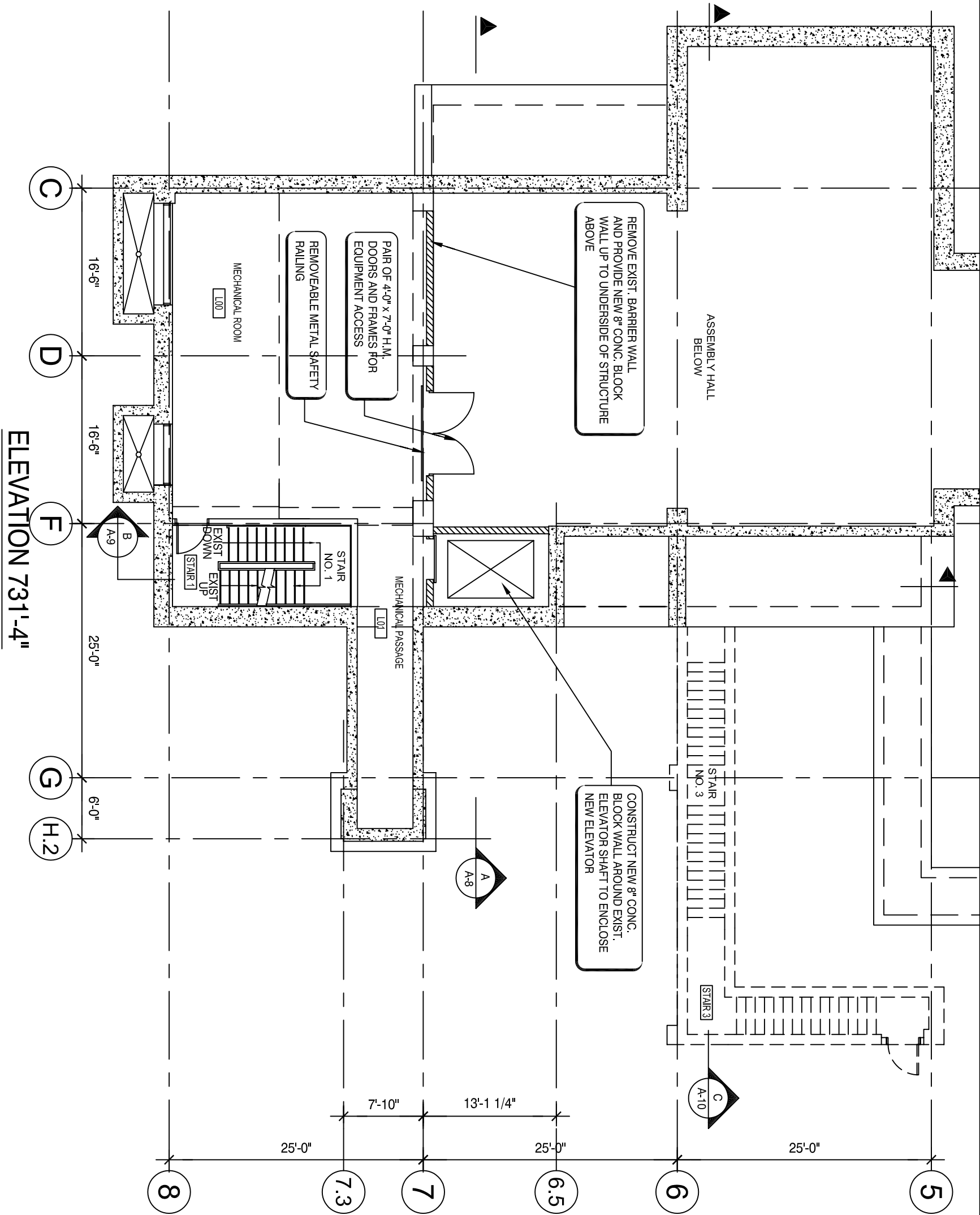
UNITED STATES DEPARTMENT OF ENERGY

C-0 OUTFITTING

SITE PLAN



[illegible]



		NAME		DATE
		DESIGNED		
		DRAWN		
		CHECKED		
		APPROVED		
REV.	DATE	DESCRIPTIONS		
		REVISIONS		
		SUBMITTED		

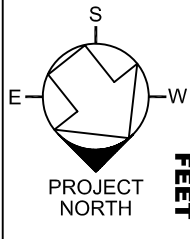

SCALE:
3/32" = 1'-0"


4 0 4 8 12 16 20 24 28

SCALE

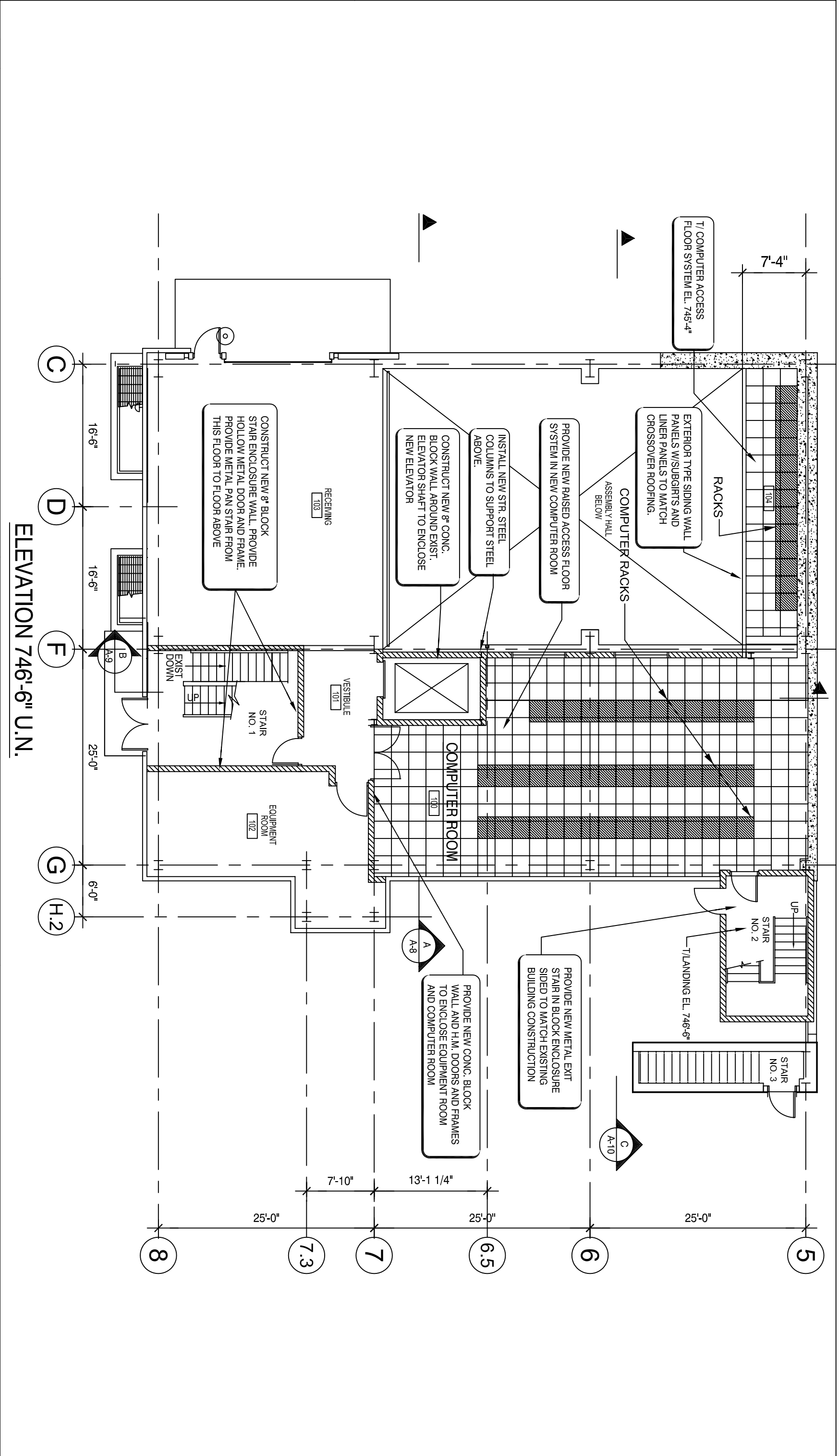
FEET

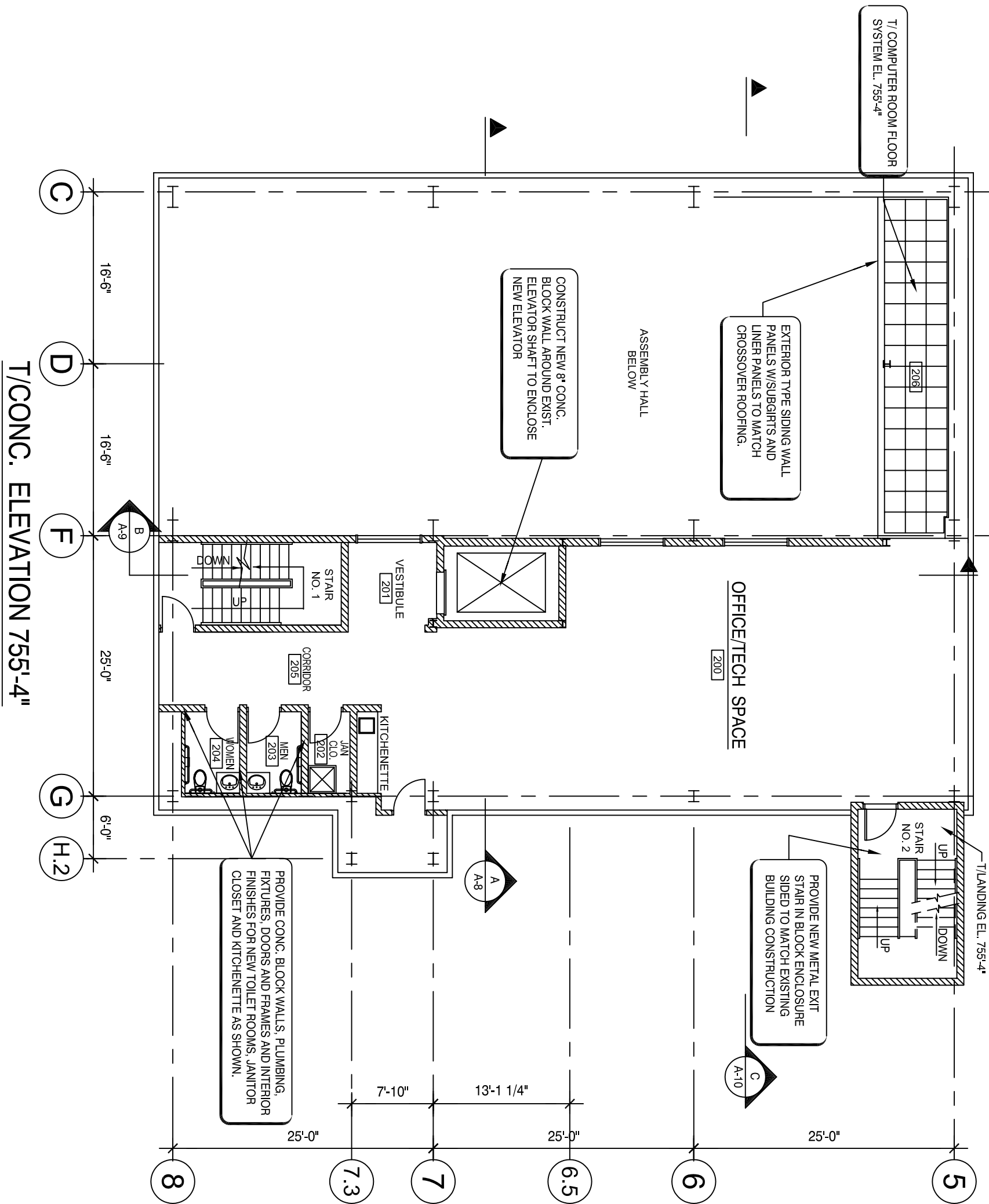
PROJECT NORTH



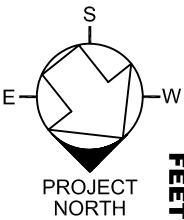
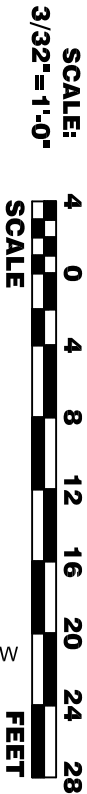
		FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY	
C-O OUTFITTING PLAN AT 731'-4"		6-8-3	CD-1 REVIEW
APRIL 2004		A-2	REV.
DRAWING NO.		REV.	


REV.	DATE	DESCRIPTIONS		REVISIONS
		DESIGNED		
		DRAWN		
		CHECKED		
		APPROVED		
		SUBMITTED		
<div><div>NAME</div><div>DATE</div></div>				
<div><div>SCALE:</div><div>3/32" = 1'-0"</div></div>				
<div><div><div>40481216202428</div><div>SCALE</div><div>FEET</div></div><div><div><div>S</div><div>W</div><div>E</div></div><div>PROJECT NORTH</div></div></div>				
<div><div><div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><</div></div></div></div></div>				



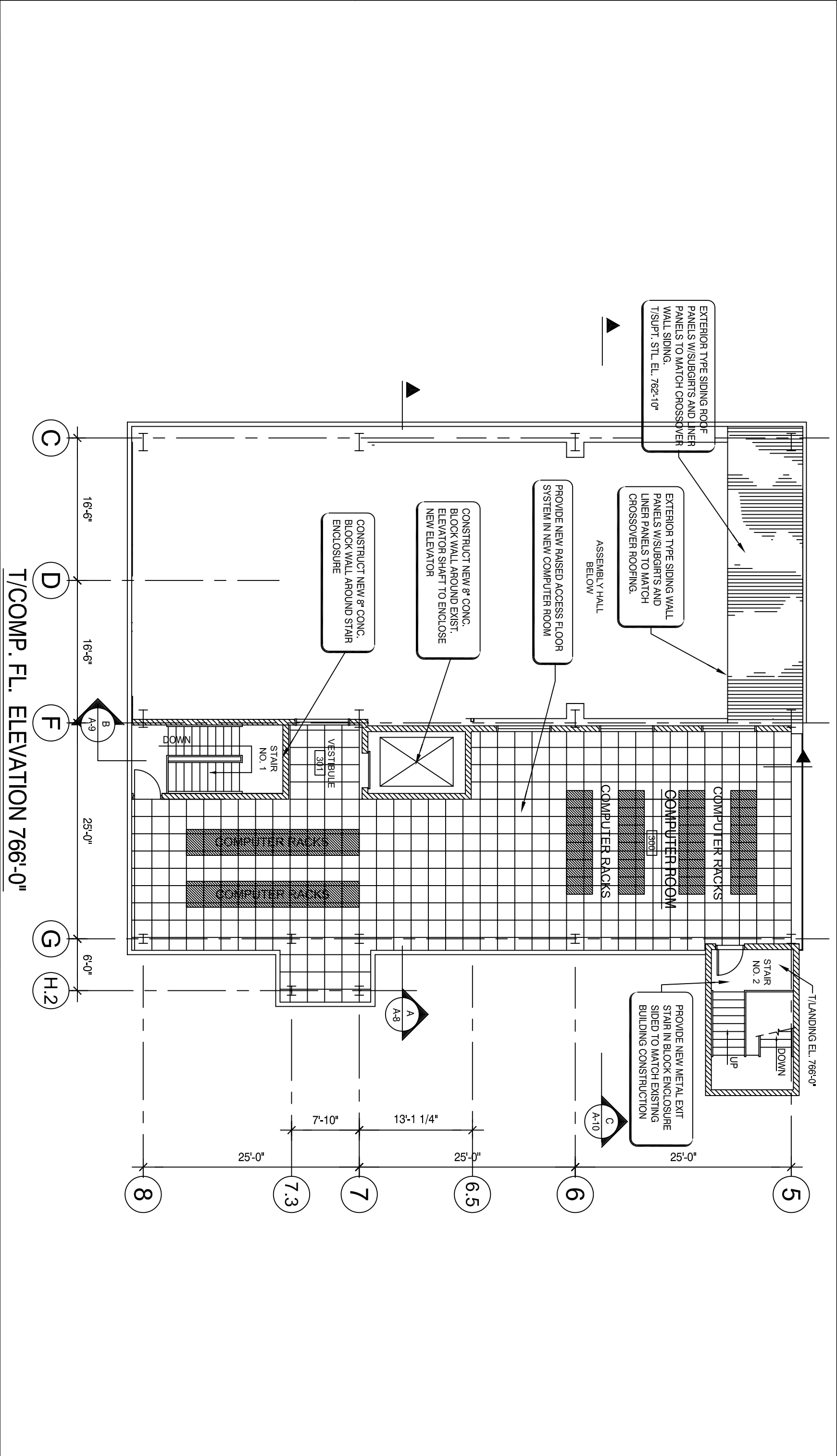


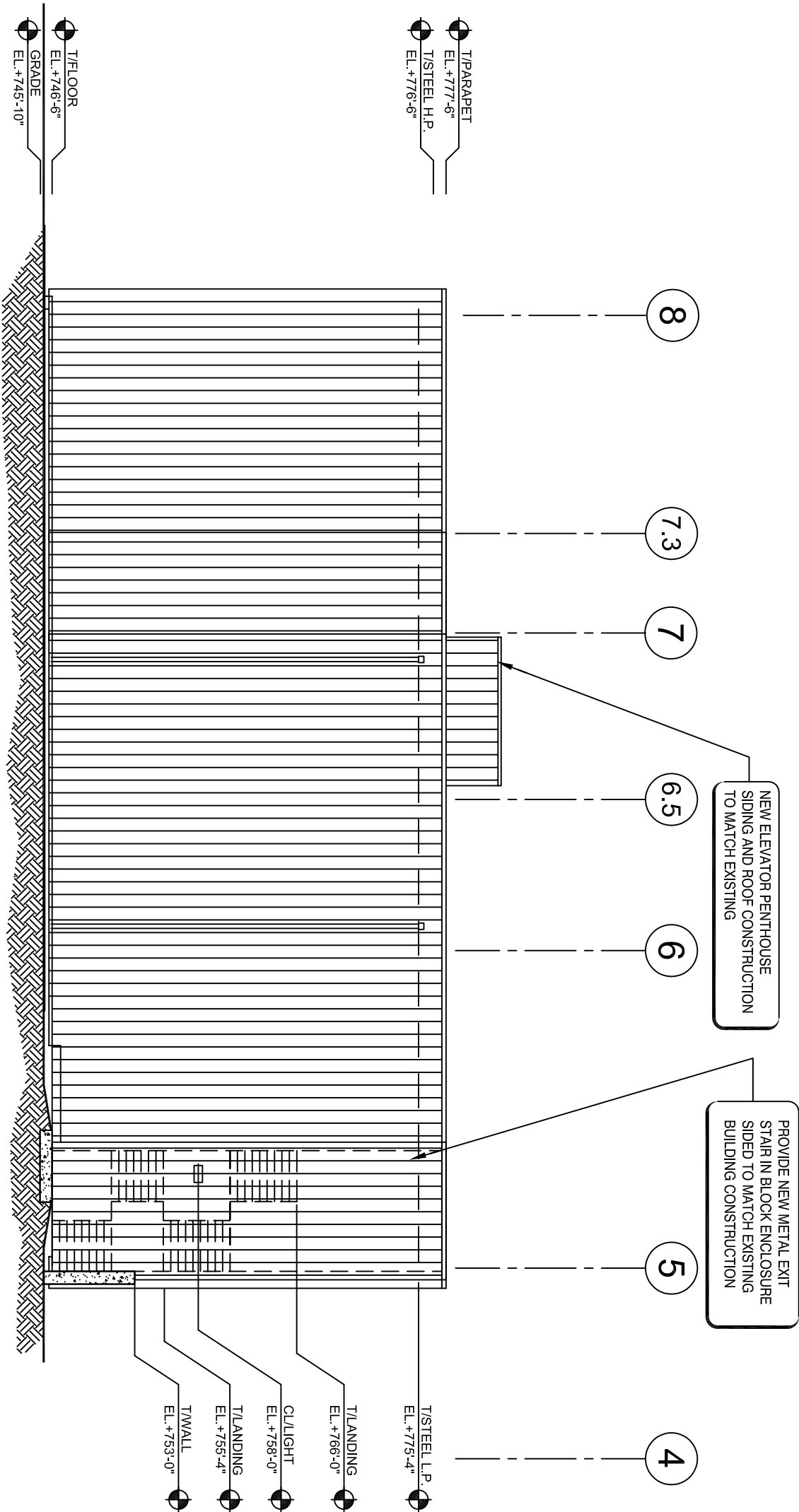
		NAME		DATE
		DESIGNED		
		DRAWN		
		CHECKED		
		APPROVED		
REV.	DATE	DESCRIPTIONS		
		REVISIONS		
		SUBMITTED		



		FERMI NATIONAL ACCELERATOR LABORATORY	
UNITED STATES DEPARTMENT OF ENERGY		C-O OUTFITTING PLAN AT 755'-4"	
DRAWING NO. 6-8-3	CD-1 REVIEW	A-4	REV.
APRIL 2004			

		NAME		DATE
		DESIGNED		
		DRAWN		
		CHECKED		
		APPROVED		
REV.	DATE	DESCRIPTIONS REVISIONS		SUBMITTED







NORTH ELEVATION LOOKING SOUTH

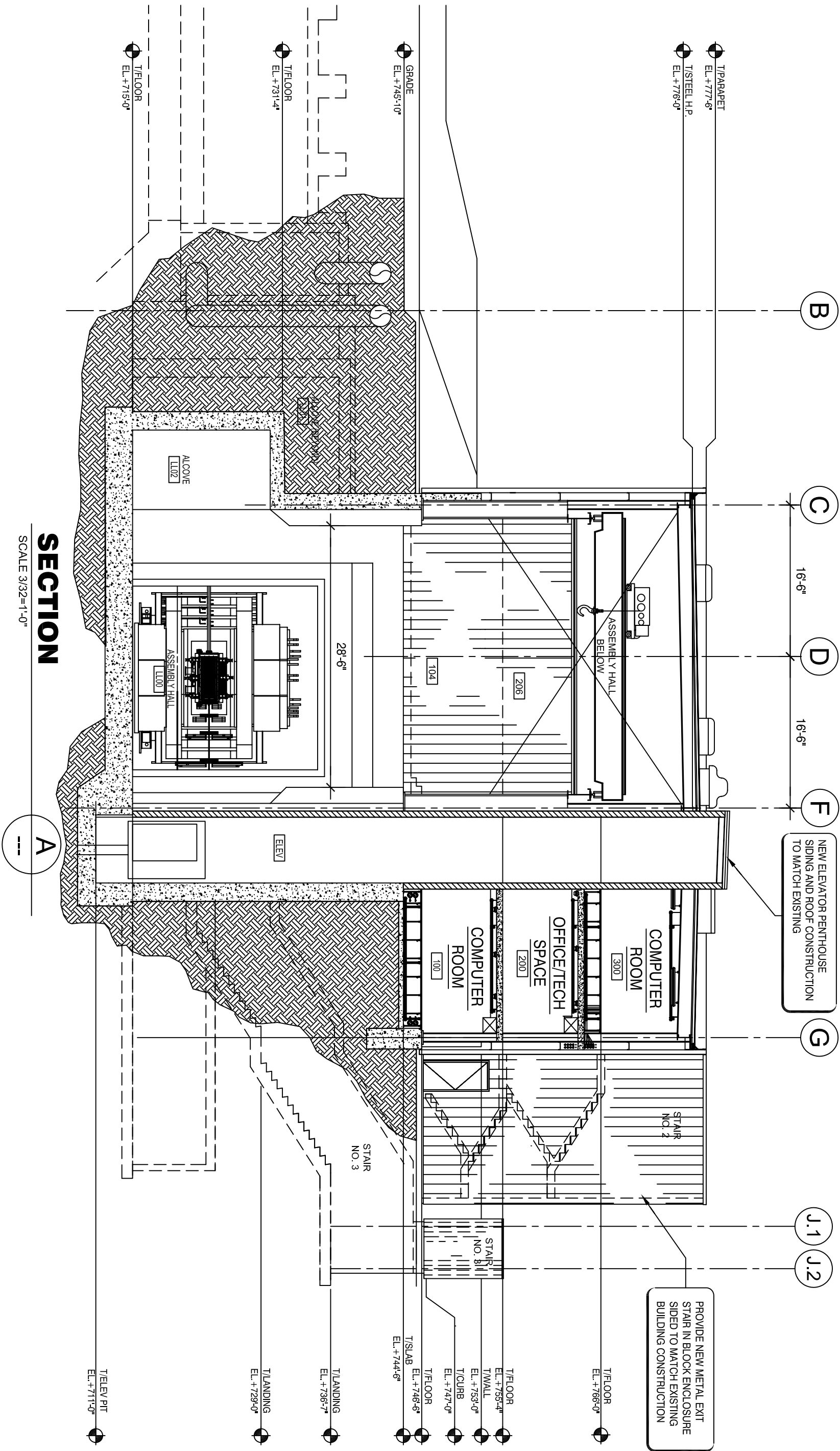
SCALE: 3/32"=1'-0"


4 0 4 8 12 16 20 24 28

SCALE

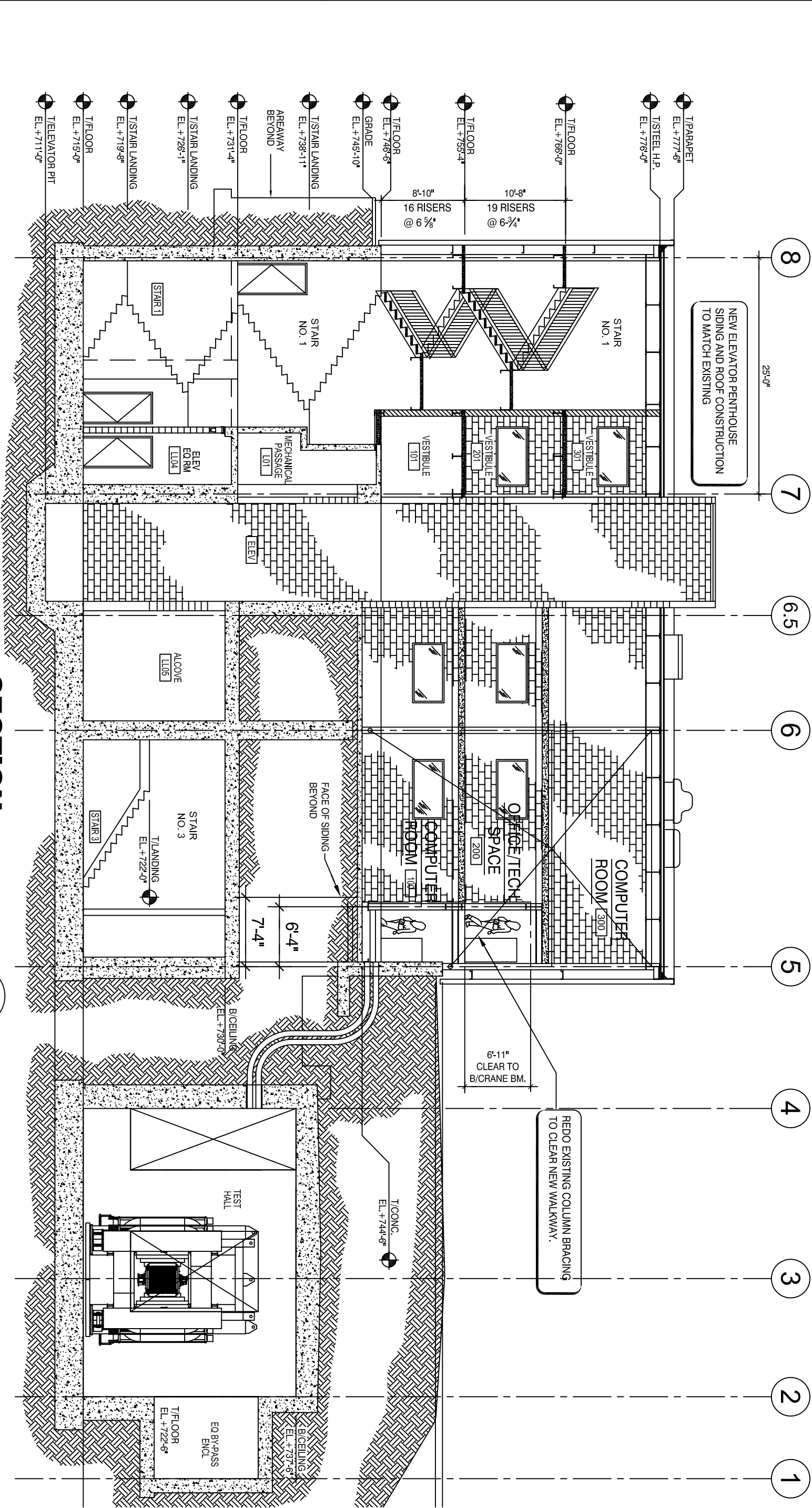
FEET

		NAME		DATE		<div>SCALE: 4 0 4 8 12 16 20 24 28</div> <div>3/32"=1'-0"</div> <div>SCALE  FEET</div>											
		DESIGNED															
		DRAWN															
		CHECKED															
		APPROVED															
		SUBMITTED															
REV.	DATE	DESCRIPTIONS REVISIONS				<div><div><div>C-0 OUTFITTING</div><div>EXTERIOR ELEVATION - SHT. 1</div></div></div>											
						DRAWING NO. 6-8-3 CD-1 REVIEW A-6 REV.											



		NAME		DATE		<div>SCALE:</div> <div>3/32" = 1'-0"</div> <div><div><div>4</div><div>0</div><div>4</div><div>8</div><div>12</div><div>16</div><div>20</div><div>24</div><div>28</div></div><div>SCALE</div><div>FEET</div></div>
		DESIGNED				
		DRAWN				
		CHECKED				
		APPROVED				
REV.	DATE	DESCRIPTIONS				
		REVISIONS				
<div><div><div>FERMI NATIONAL ACCELERATOR LABORATORY</div><div>UNITED STATES DEPARTMENT OF ENERGY</div></div><div><div><div><div></div><div>C-O OUTFITTING</div><div>BUILDING SECTION SHT. - 1</div></div><div><div>DRAWING NO. 6-8-3</div><div>CD-1 REVIEW</div><div>A-8</div></div><div>REVISED</div></div></div></div>						

		NAME		DATE
		DESIGNED		
		DRAWN		
		CHECKED		
		APPROVED		
REV.	DATE	DESCRIPTIONS REVISIONS		SUBMITTED



SECTION

SCALE 3/32"=1'-0"

SCALE: 3/32"=1'-0"

4 0 4 8 12 16 20 24 28

SCALE FEET

B

FERMI NATIONAL ACCELERATOR LABORATORY

UNITED STATES DEPARTMENT OF ENERGY

C-O OUTFITTING

BUILDING SECTION SHT. - 2

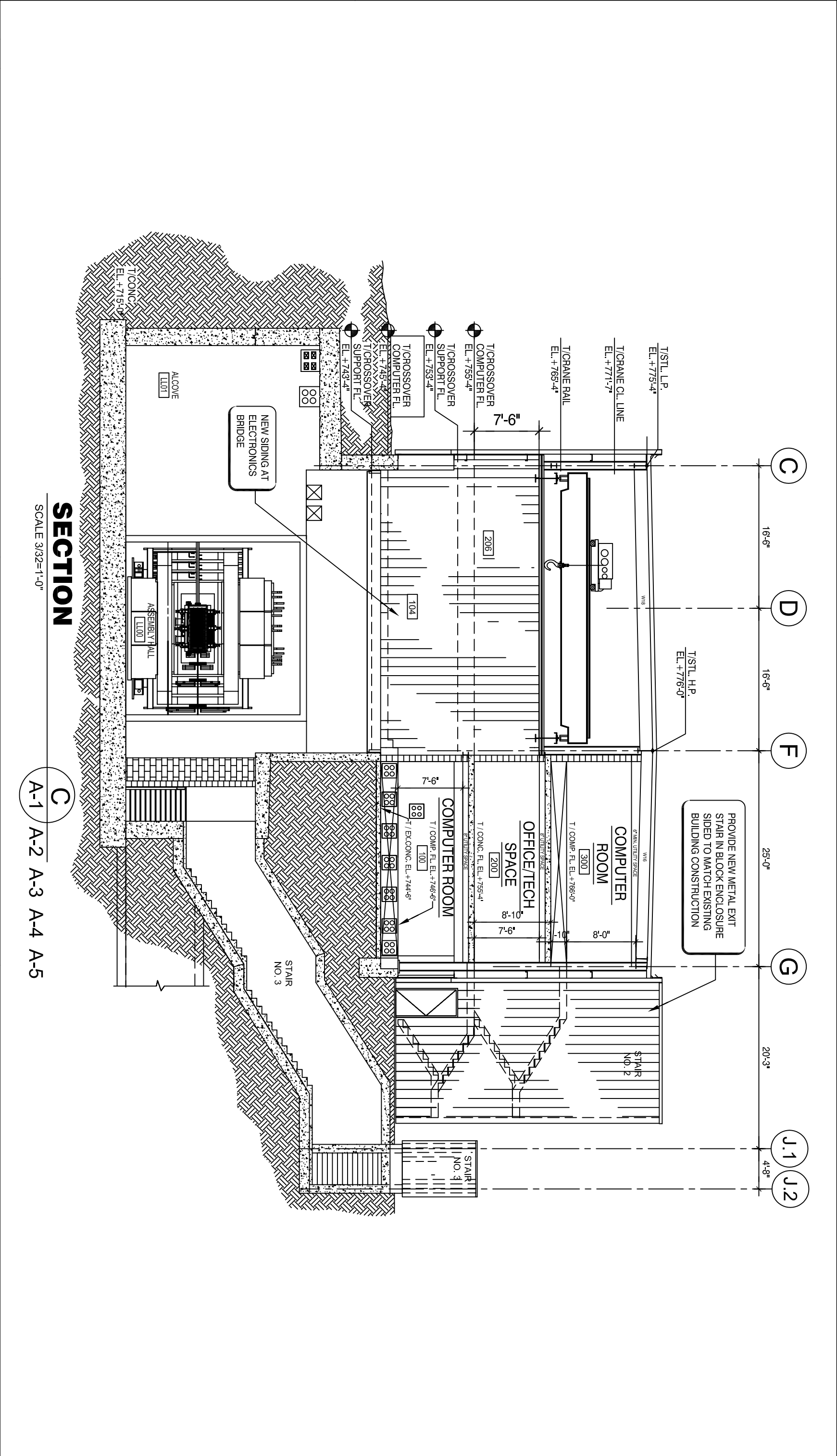
DRAWING NO.

6-8-3

CD-1 REVIEW

A-9

REV.

[illegible]


		NAME		DATE
		DESIGNED		
		DRAWN		
		CHECKED		
		APPROVED		
REV.	DATE	DESCRIPTIONS		
		REVISIONS		
		SUBMITTED		

SCALE:
3/32"=1'-0"


4 0 4 8 12 16 20 24 28

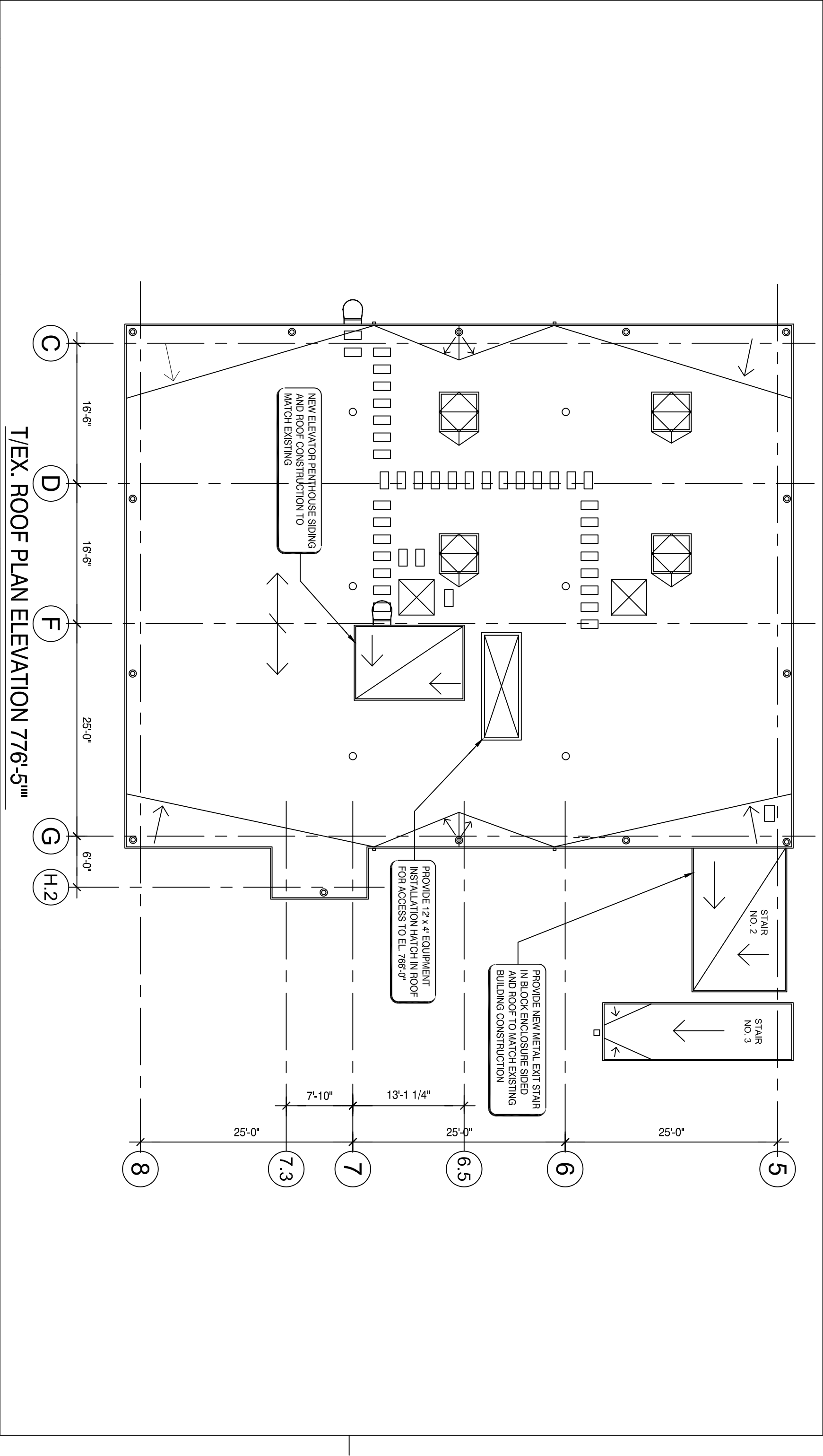
SCALE

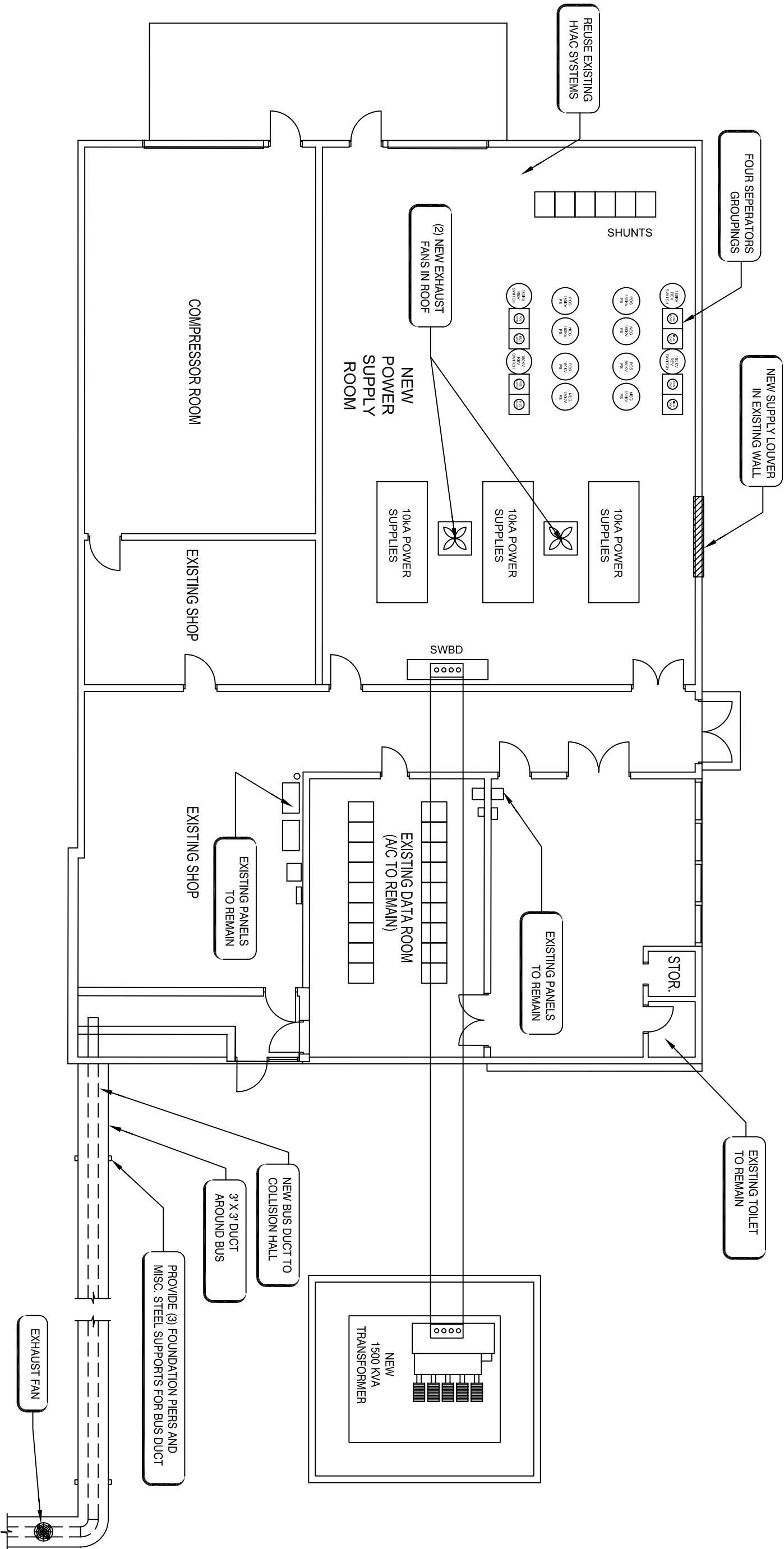
FEET



PROJECT NORTH

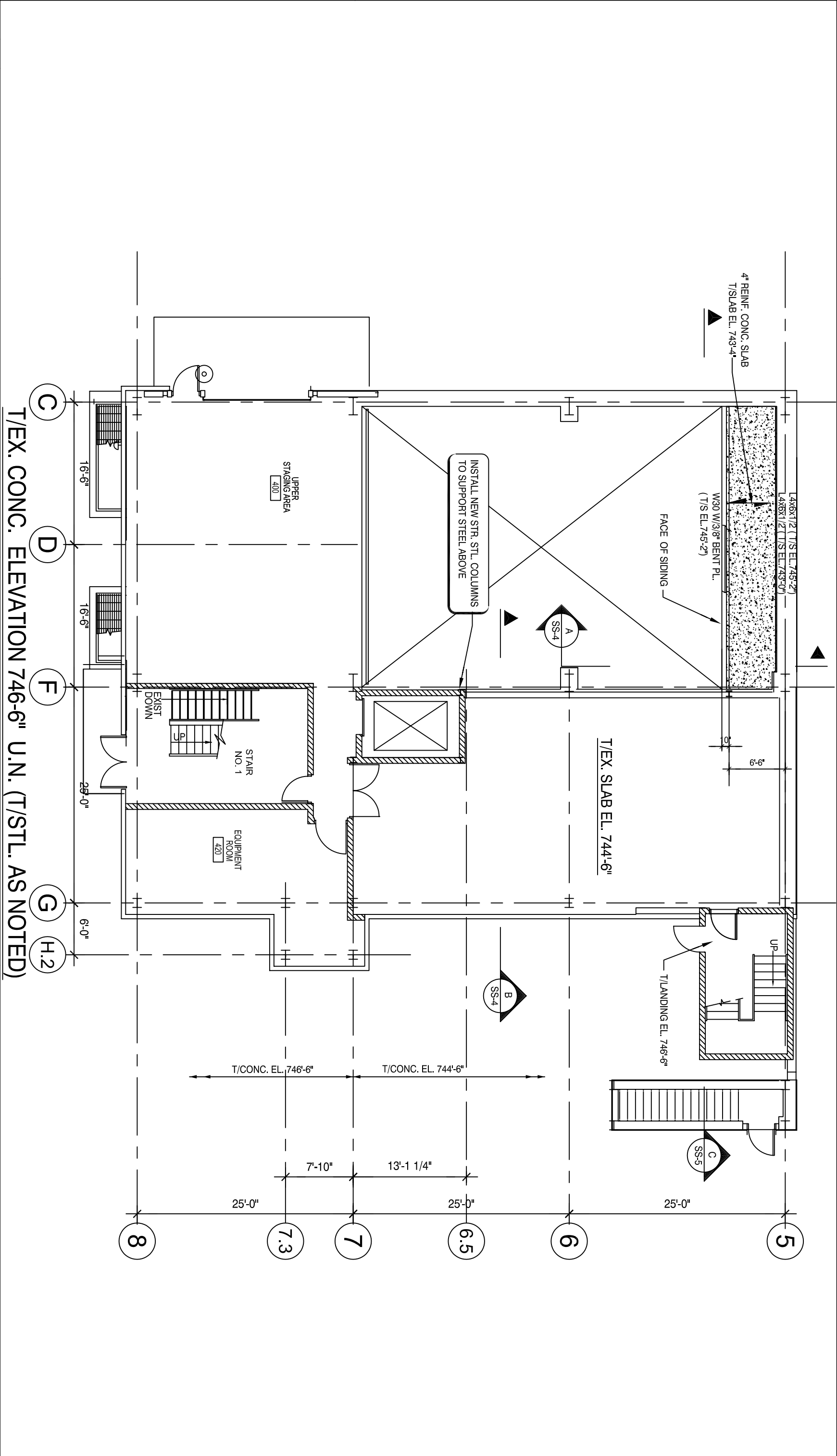
FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY	
	C-O OUTFITTING ROOF PLAN AT H.P. EL. 776'-5"
DRAWING NO. 6-8-3	CD-1 REVIEW A-11
REV.	
APRIL 2004	





EXISTING C0 SERVICE BLDG. - T/FLOOR 744'-0"

		NAME		DATE	
DESIGNED					
DRAWN					
CHECKED					
APPROVED					
REV.	DATE	DESCRIPTIONS		REVISIONS	
		SCALE: 3/32"=1'-0"		SCALE	
		4 0 4 8 12 16 20 24 28		FEET	
		PROJECT NORTH			
		FERMI NATIONAL ACCELERATOR LABORATORY		UNITED STATES DEPARTMENT OF ENERGY	
		C-0 OUTFITTING		C-0 SERVICE BLDG. PLAN @ EL. 744'-0"	
		DRAWING NO. 6-8-3		CD-1 REVIEW	
		A-12		REV.	
		APRIL 2004			

[illegible]

		NAME		DATE
		DESIGNED		
		DRAWN		
		CHECKED		
		APPROVED		
REV.	DATE	DESCRIPTIONS		
		REVISIONS		
		SUBMITTED		

SCALE:
3/32"=1'-0"


4 0 4 8 12 16 20 24 28

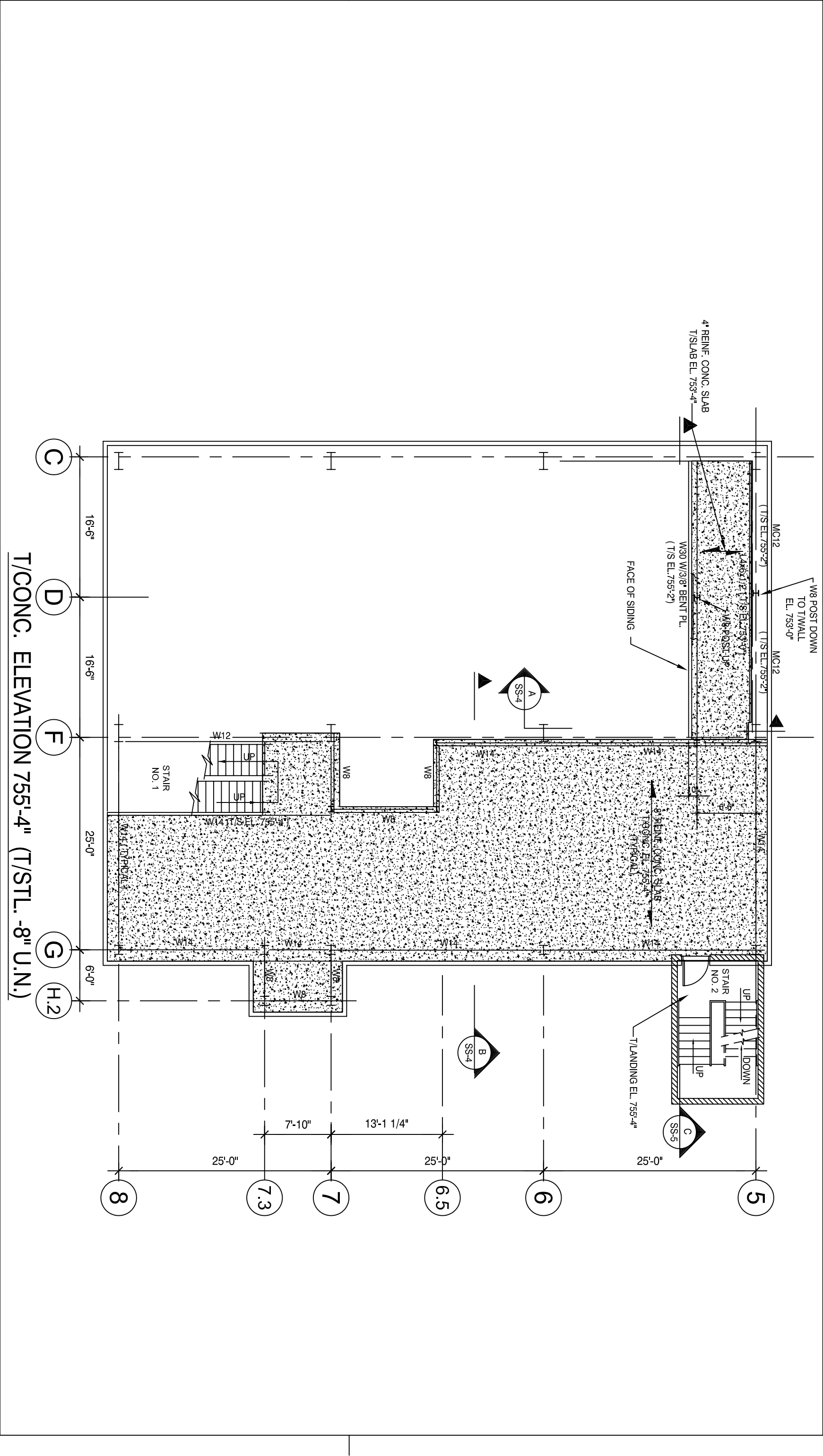
SCALE

FEET

S
E W

PROJECT NORTH

FERMI NATIONAL ACCELERATOR LABORATORY	
UNITED STATES DEPARTMENT OF ENERGY	
	C-0 OUTFITTING STRUCTURAL PLAN AT 755'-4"
DRAWING NO. 6-8-3	CD-1 REVIEW SS-2
	REV.
APRIL 2004	



		NAME		DATE
		DESIGNED		
		DRAWN		
		CHECKED		
		APPROVED		
REV.	DATE	DESCRIPTIONS		
		REVISIONS		
		SUBMITTED		


SCALE:
 $3/32" = 1'-0"$


4 0 4 8 12 16 20 24 28

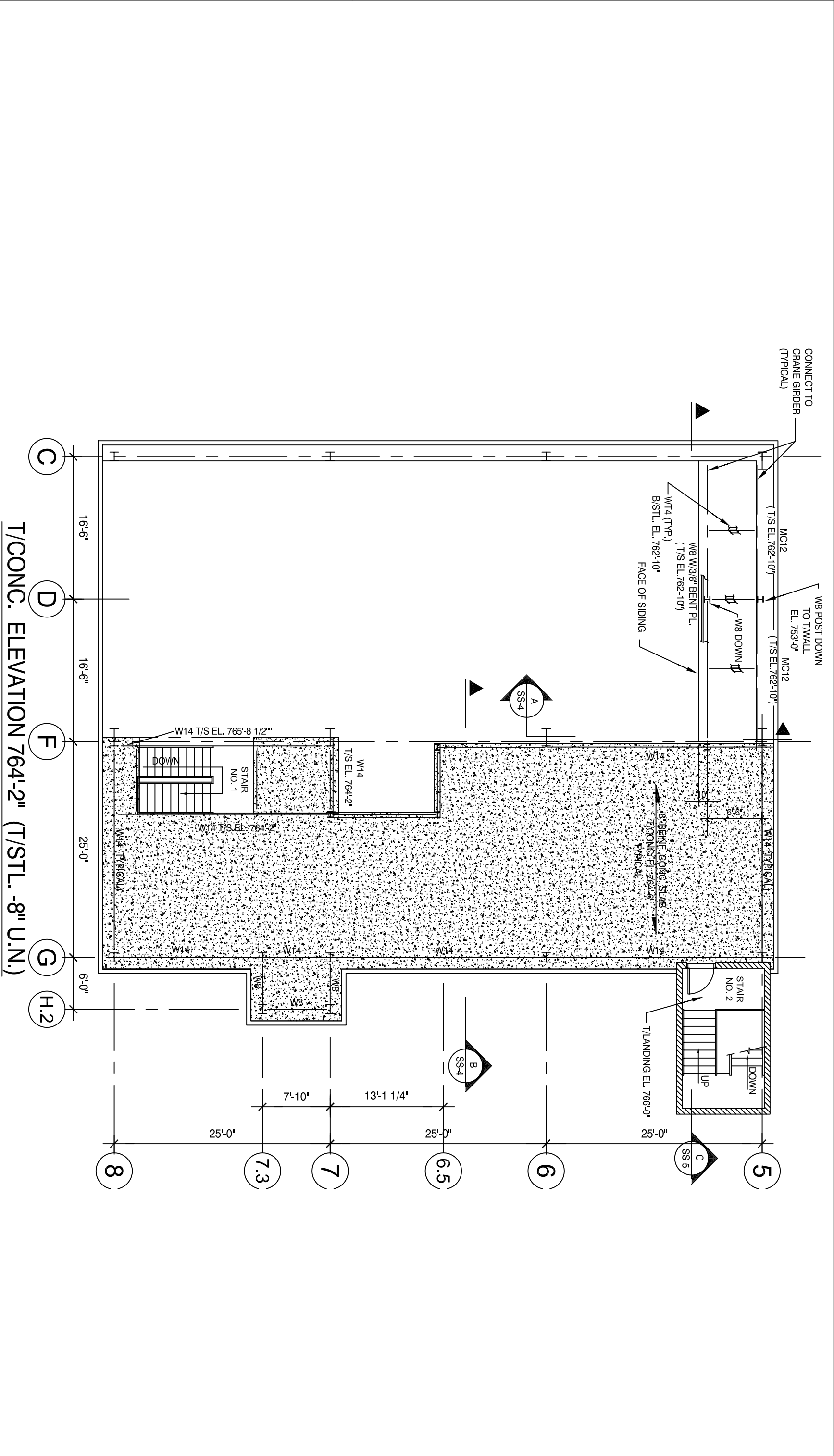
SCALE

FEET

PROJECT NORTH



FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY	
	C-0 OUTFITTING STRUCTURAL PLAN AT 764'-2"
DRAWING NO. 6-8-3	CD-1 REVIEW SS-3
	REV.
APRIL 2004	



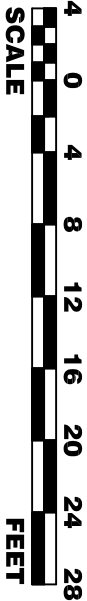
		NAME		DATE	
REV.	DATE	DESIGNED			
		DRAWN			
		CHECKED			
		APPROVED			
DESCRIPTIONS		SUBMITTED			
REVISIONS					

SECTION

SCALE 3/32"=1'-0"

A

SS-1 SS-2 SS-3



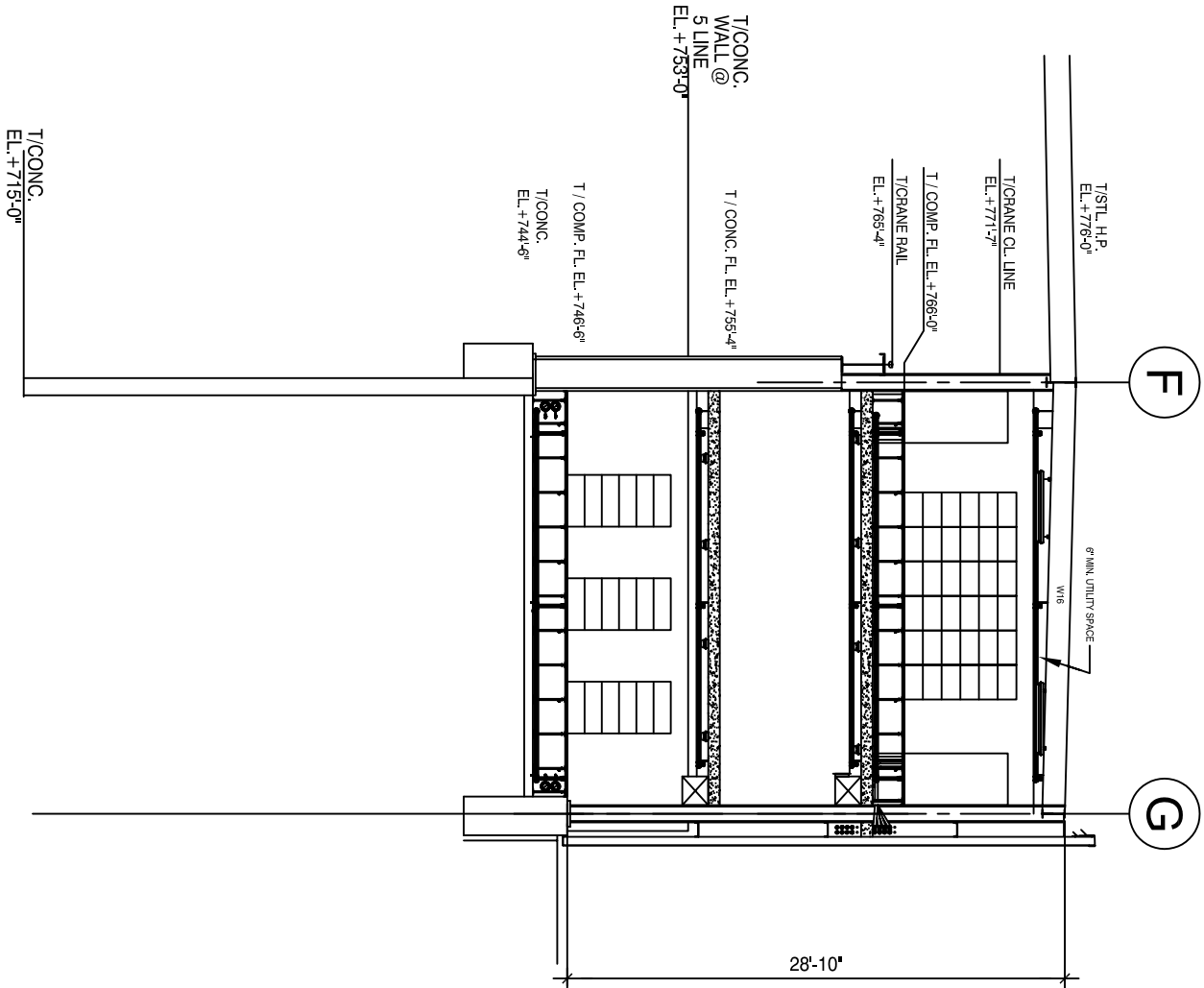
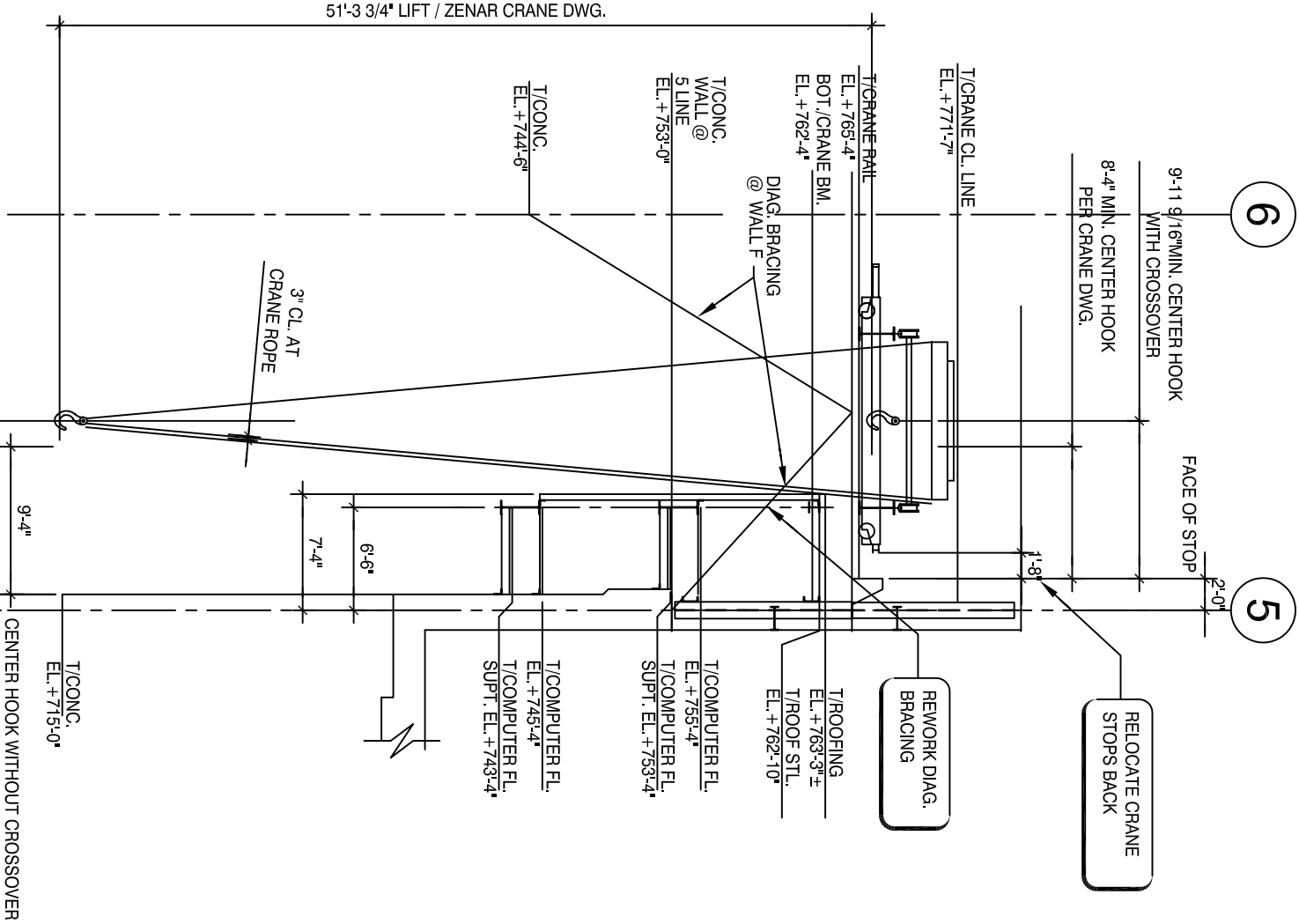
SECTION

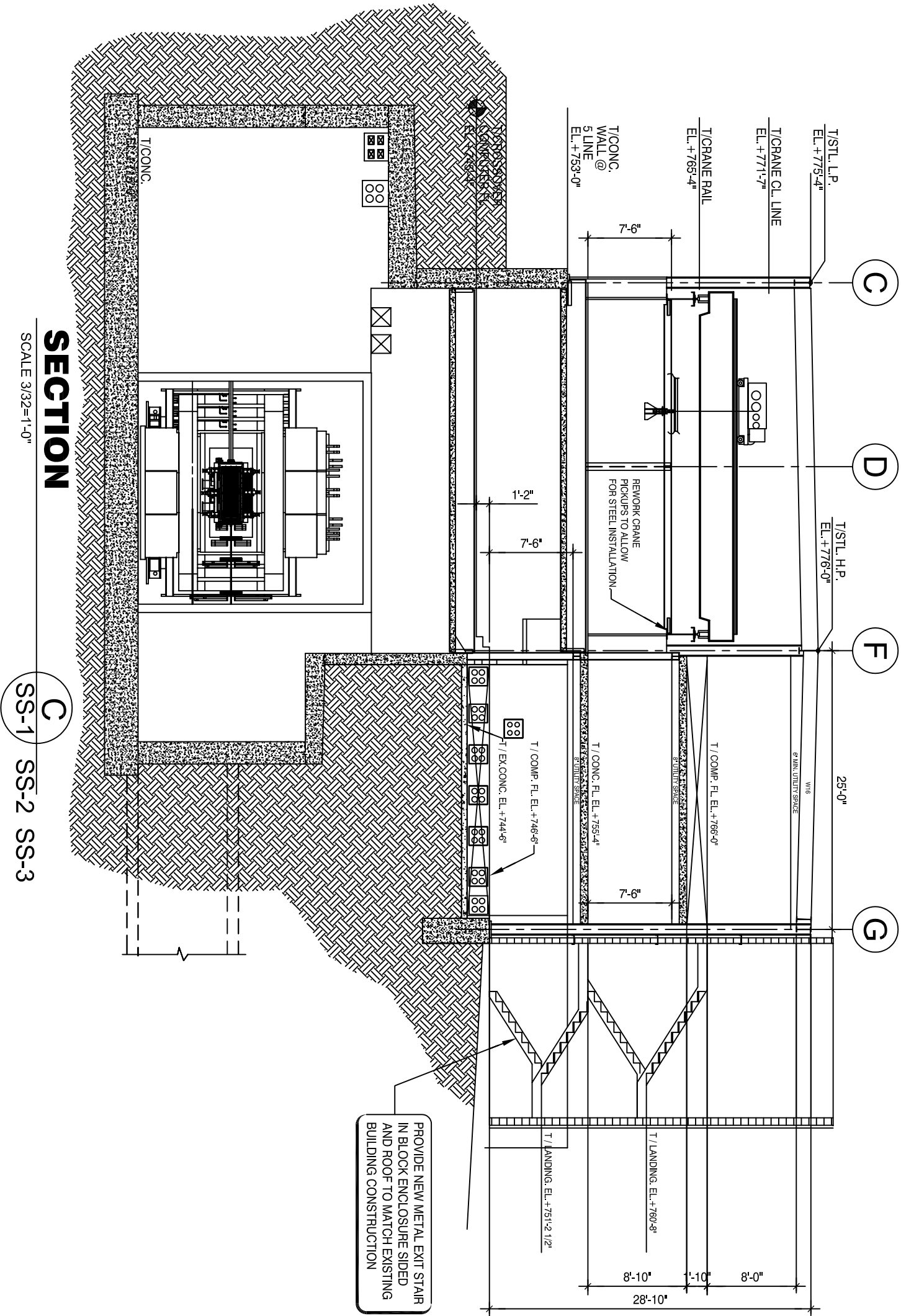
SCALE 3/32"=1'-0"

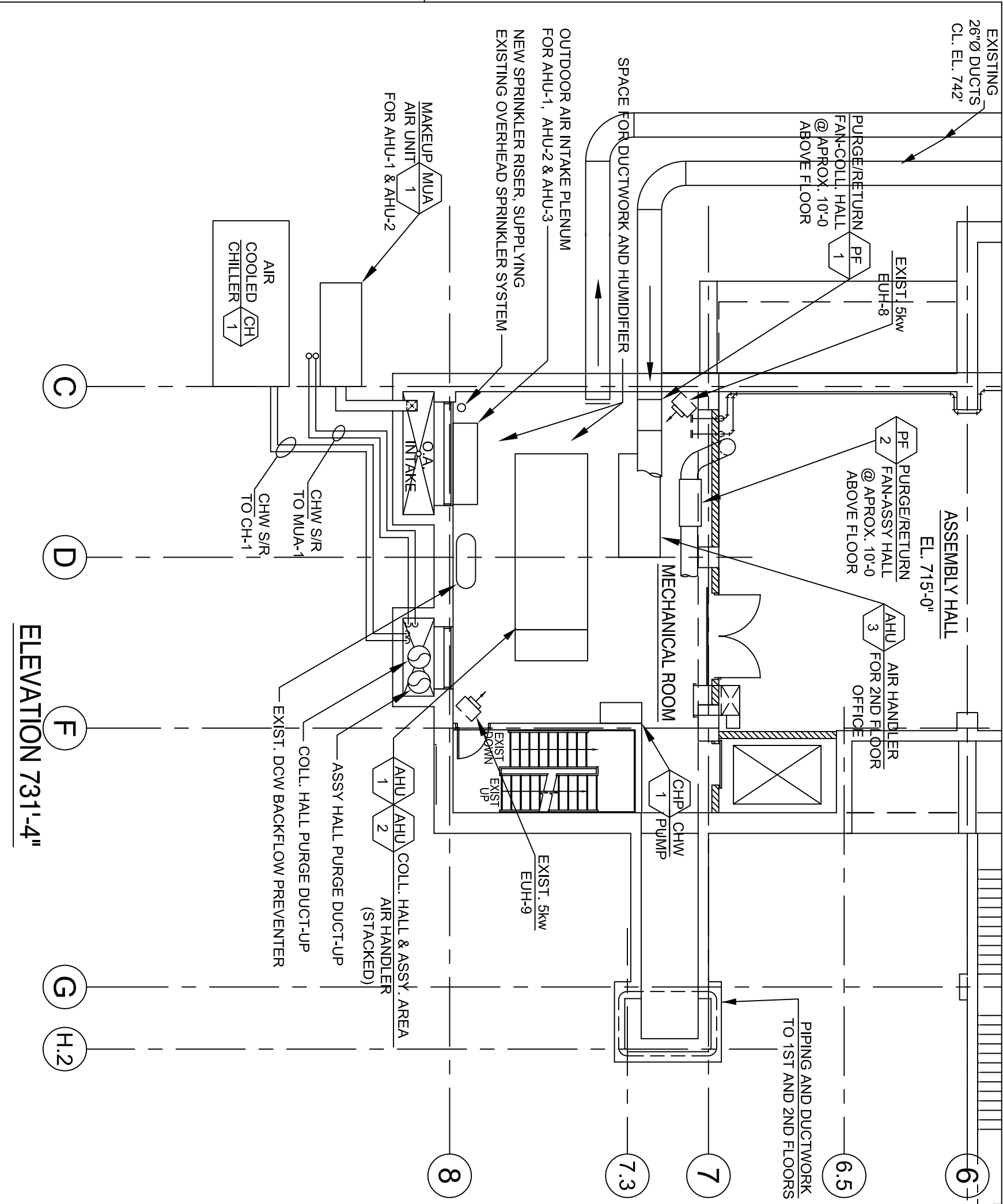
B

SS-1 SS-2 SS-3

FERMI NATIONAL ACCELERATOR LABORATORY	
UNITED STATES DEPARTMENT OF ENERGY	
C-O OUTFITTING	
BUILDING SECTIONS - SHT. 1	
DRAWING NO.	6-8-3
CD-1 REVIEW	SS-4
REV.	

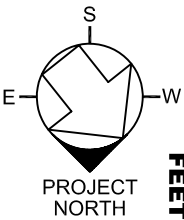
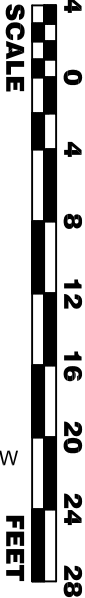


[illegible]



ELEVATION 731'-4"

SCALE: 3/32"=1'-0"



MECHANICAL ROOM

MECHANICAL HVAC CRITERIA

ENVIRONMENT-----HEATING & VENTILATION

TEMPERATURE --- 60° F to 80°F

HUMIDITY-----UNCONTROLLED

OCCUPANCY----- 0

FIRE PROTECTION CRITERIA

- PROVIDE NEW WET-TYPE AUTOMATIC SPRINKLER SYSTEM DESIGNED TO O.H. PROTECT MECHANICAL ROOM.

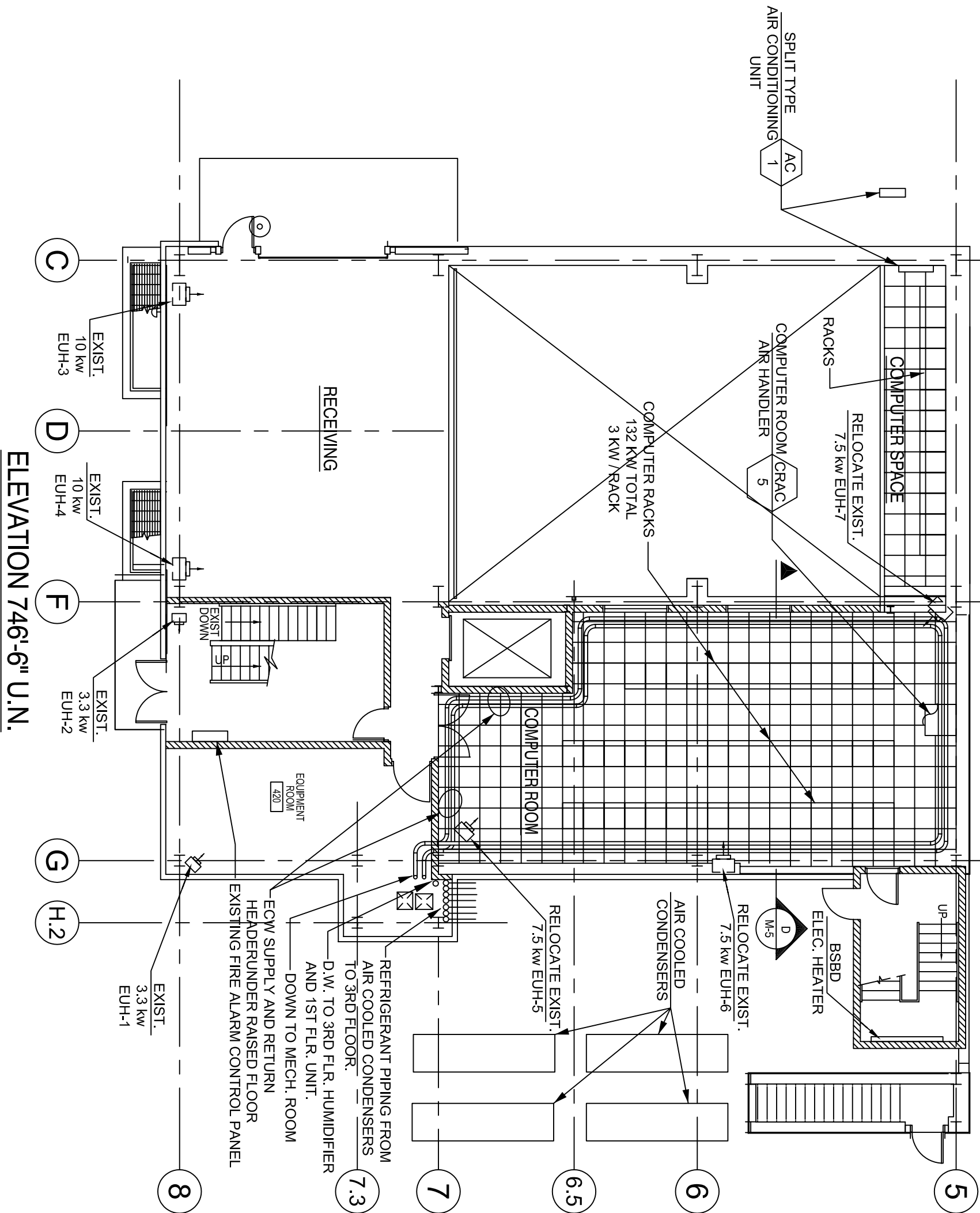
GAS SHED (NOT SHOWN)

MECHANICAL HVAC CRITERIA

-----NONE-----

FIRE PROTECTION CRITERIA

-----NONE-----



1ST FLOOR COMPUTER ROOM

MECHANICAL HVAC CRITERIA

TEMPERATURE --- 75° F

HUMIDITY----- 50% RH

OCCUPANCY ----- 5

EQUIP. LOAD ----- 132 KW TOTAL

NON-CONDENSING

NON SOUND
TO RACKS)

FIRE PROTECTION CRITERIA

- PROVIDE HIGH VELOCITY SPOT TYPE

SMOKE DETECTION ABOVE & BELOW

RAISED FLOOR PER NFPA-72.

- PROVIDE WET-TYPE AUTOMATIC

SPRINKLER SYSTEM BELOW RAISED

FLOOR PER NFPA-13

- PROVIDE NEW WEI-TYPE AUTOMATIC

ORDINARY HAZARD PER NEPA-13.

UPPER STAGING AREA

MECHANICAL HVAC CRITERIA

HEATING ONLY

FIRE PROTECTION CRITERIA

● EXISTING SYSTEM

EQUIPMENT ROOM

MECHANICAL HVAC CRITERIA

-----NONE-----

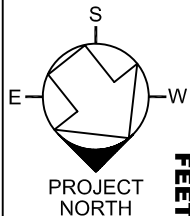
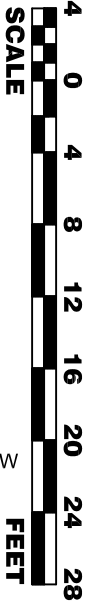
FIRE PROTECTION CRITERIA

- PROVIDE NEW WET-TYPE AUTOMATIC SPRINKLER SYSTEM DESIGNED TO AN ORDINARY HAZARD PER NFPA-13.

		NAME		DATE
		DESIGNED		
		DRAWN		
		CHECKED		
		APPROVED		
REV.	DATE	DESCRIPTIONS		
		REVISIONS		
		SUBMITTED		

ELEVATION 746'-6" U.N.N.

SCALE:

**FERMI NATIONAL ACCELERATOR LABORATORY**

UNITED STATES DEPARTMENT OF ENERGY

C-O OUTFITTING

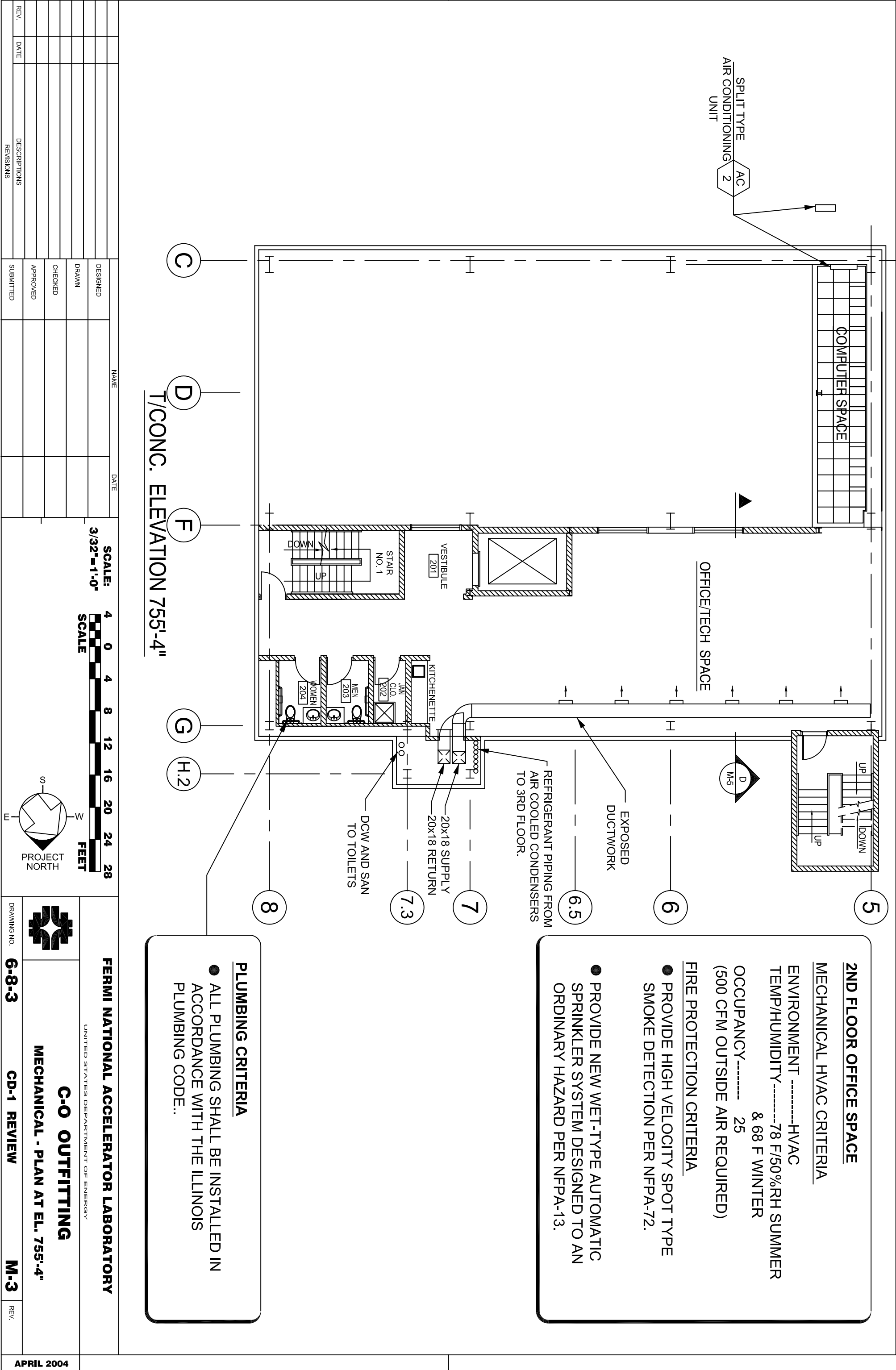
MECHANICAL - PLAN AT EL. 746'-6"

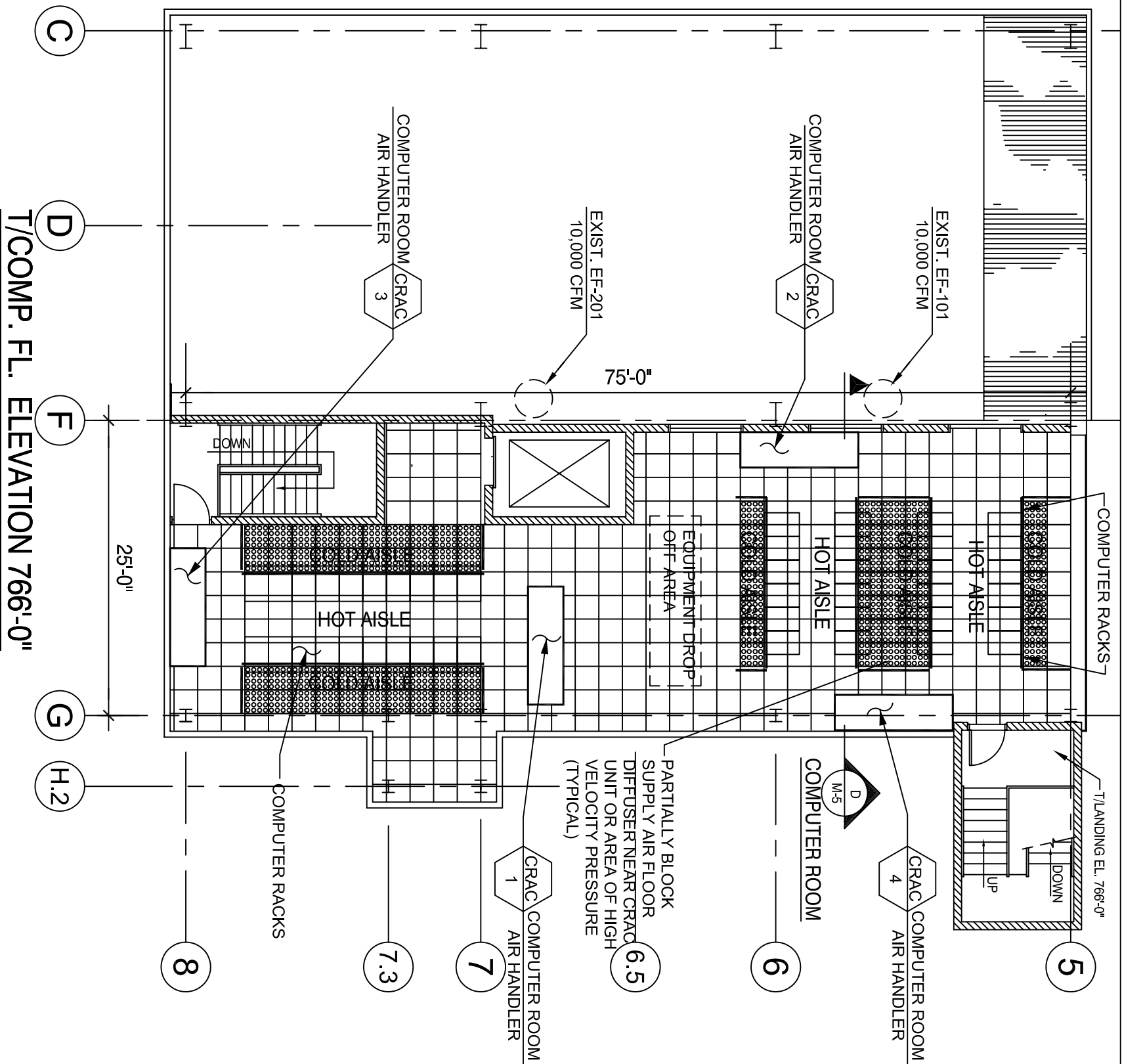
DRAWING NO.

6-3-3

CD-1 REVIEW

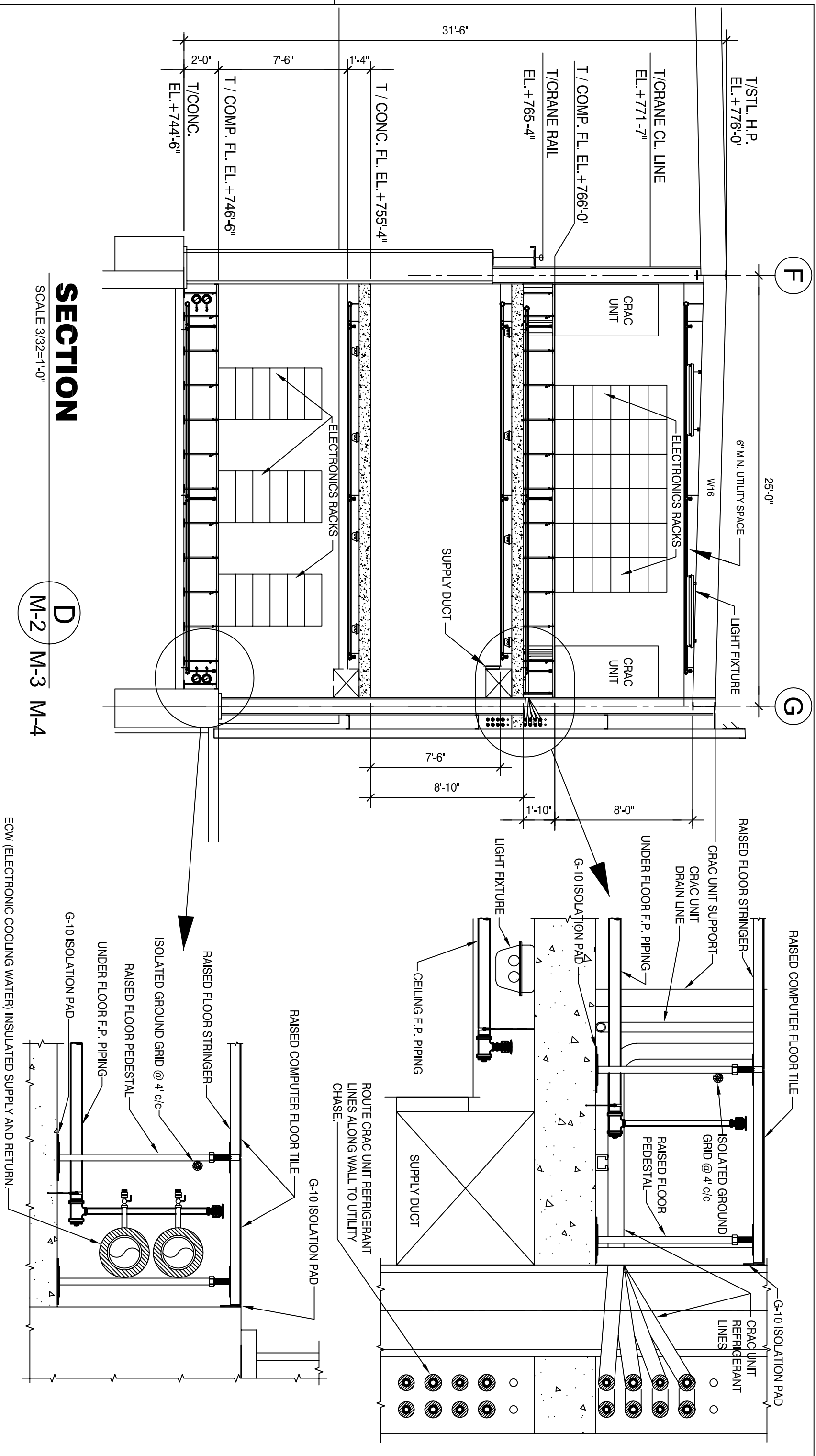
M-2

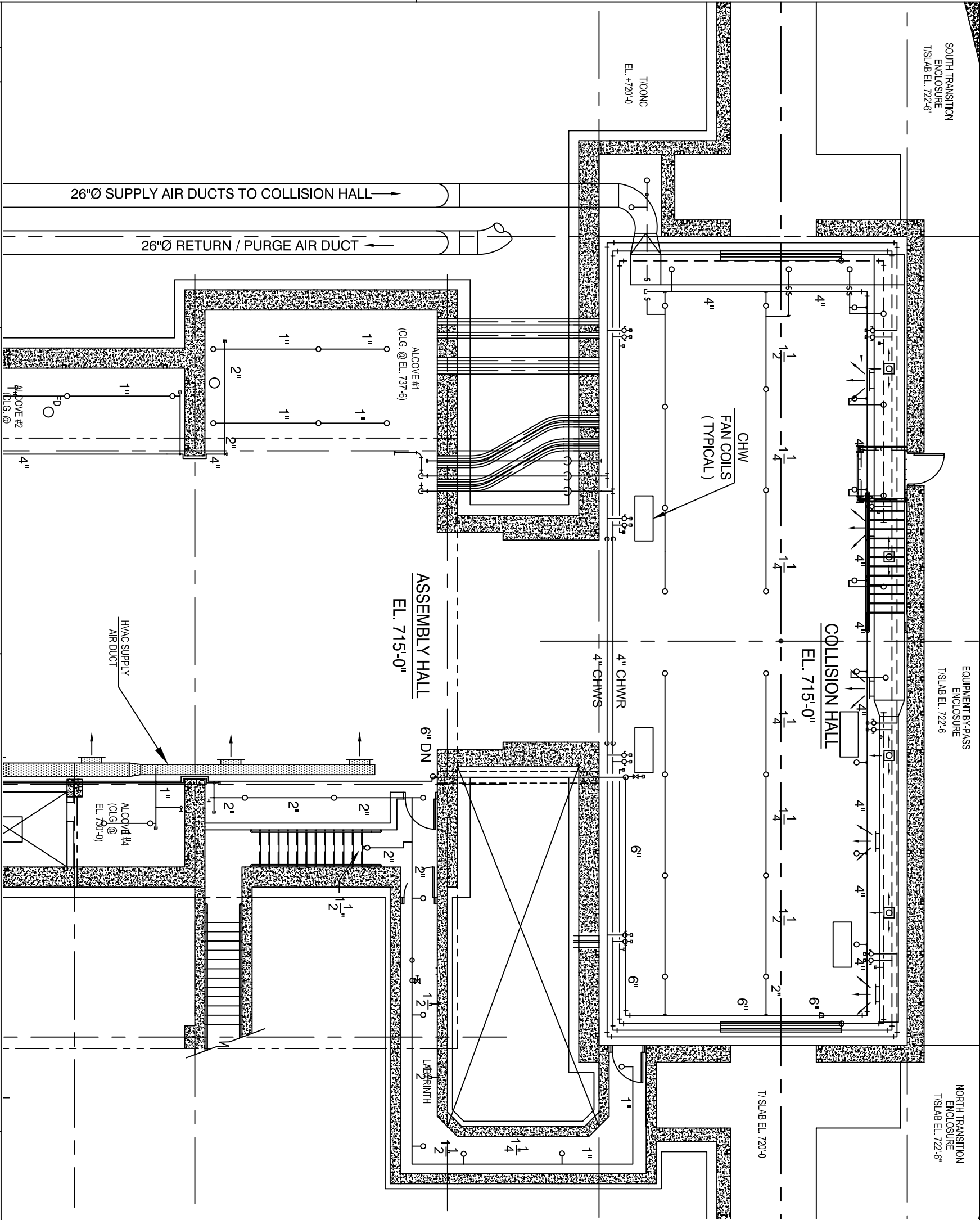




- 3RD FLOOR HIGH DENSITY COMPUTER ROOM**
- MECHANICAL HVAC CRITERIA**
- ENVIRONMENT-----HVAC
TEMP./HUMIDITY-----72°/45% RH ±5%RH
(SUMMER & WINTER)
OCCUPANCY----- 5
EQUIP. LOAD ----- ~ 342 TO 350 KW
- FIRE PROTECTION CRITERIA**
- PROVIDE HIGH VELOCITY SPOT TYPE SMOKE DETECTION ABOVE & BELOW RAISED FLOOR PER NFPA-72.
 - PROVIDE WET-TYPE AUTOMATIC SPRINKLER SYSTEM BELOW RAISED FLOOR PER NFPA-13.
 - PROVIDE NEW WET-TYPE AUTOMATIC SPRINKLER SYSTEM DESIGNED TO AN ORDINARY HAZARD PER NFPA-13.

[illegible]

[illegible]



COLLISION HALL

MECHANICAL HVAC CRITERIA

I. NORMAL HVAC MODE

ENVIRONMENT	HVAC
TEMPERATURE	60° F to 80° F
HUMIDITY	40% to 50% RH
MAKEUP AIR	53° F DEWPOINT NO LESS THAN 50 CFM
EQUIP. LOAD TO AIR	~ 37 KW
II. ODH PURGE MODE	
ENVIRONMENT	HV
TEMPERATURE	ABOVE FREEZING
HUMIDITY	NONE
ODH CFM	5000 CFM

ASSEMBLY HALL

MECHANICAL HVAC CRITERIA

I. NORMAL HVAC MODE

ENVIRONMENT	HVAC
TEMPERATURE	60° F to 80° F
HUMIDITY	40% to 50% RH
MAKEUP AIR	NO LESS THAN 50 CFM
EQUIP. LOAD TO AIR	~ 4 KW

II. ODH PURGE MODE

ENVIRONMENT	HV
TEMPERATURE	ABOVE FREEZING
HUMIDITY	NONE
ODH CFM	5000 CFM

COLLISION HALL & ASSEMBLY HALL

FIRE PROTECTION CRITERIA

- NEW PREACTION AUTOMATIC SPRINKLER RISER CONNECTED TO EXISTING PIPING PROTECTING HALL.
- PROVIDE AIR SAMPLING DETECTION AND SYSTEM PER NFPA-72.

FERMI NATIONAL ACCELERATOR LABORATORY

UNITED STATES DEPARTMENT OF ENERGY

C-O OUTFITTING

MECHANICAL - PLAN AT EL. 715'-0"



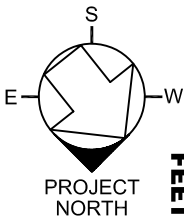
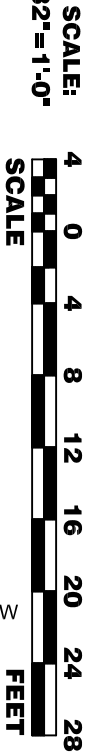
DRAWING NO.

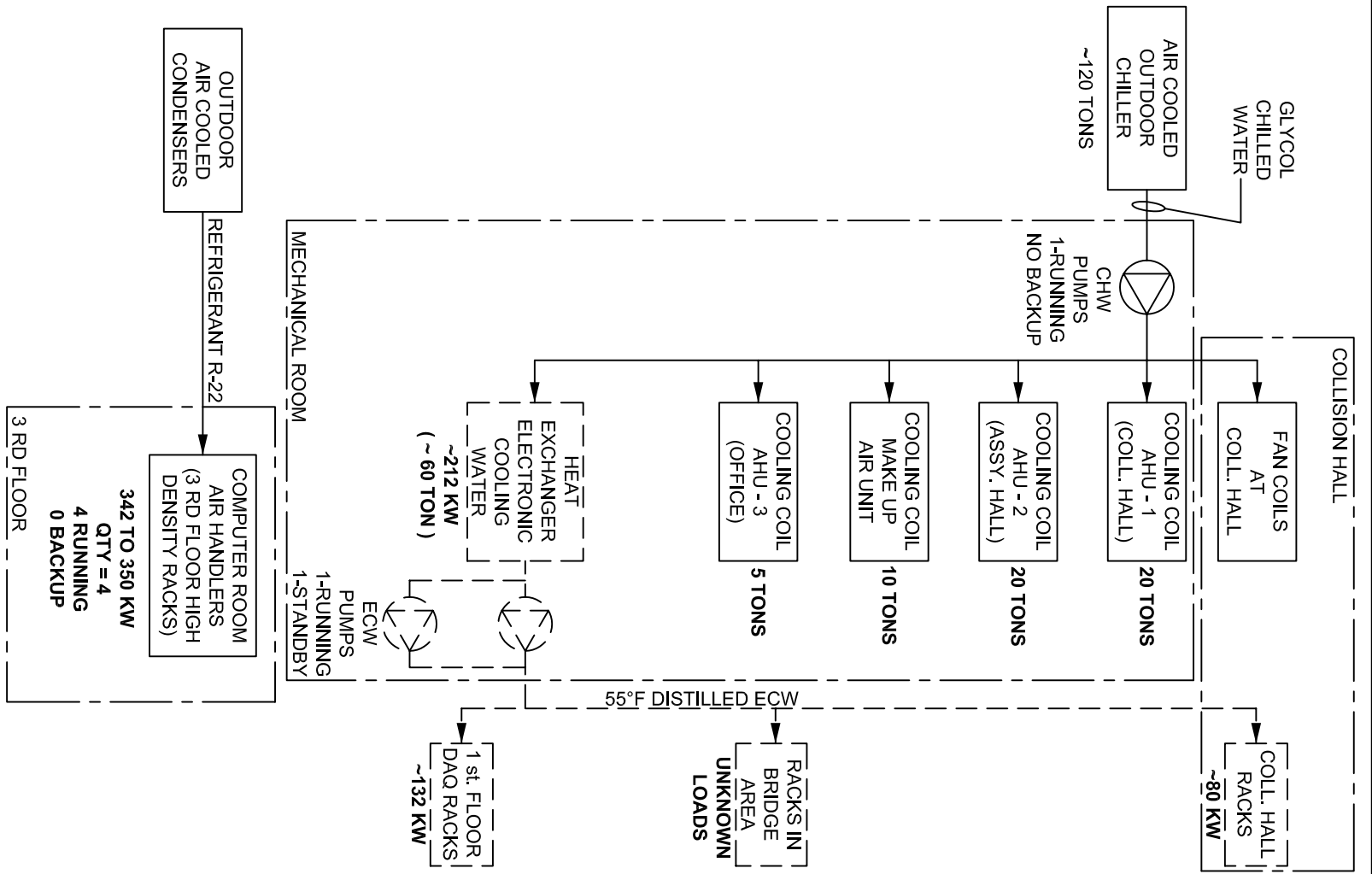
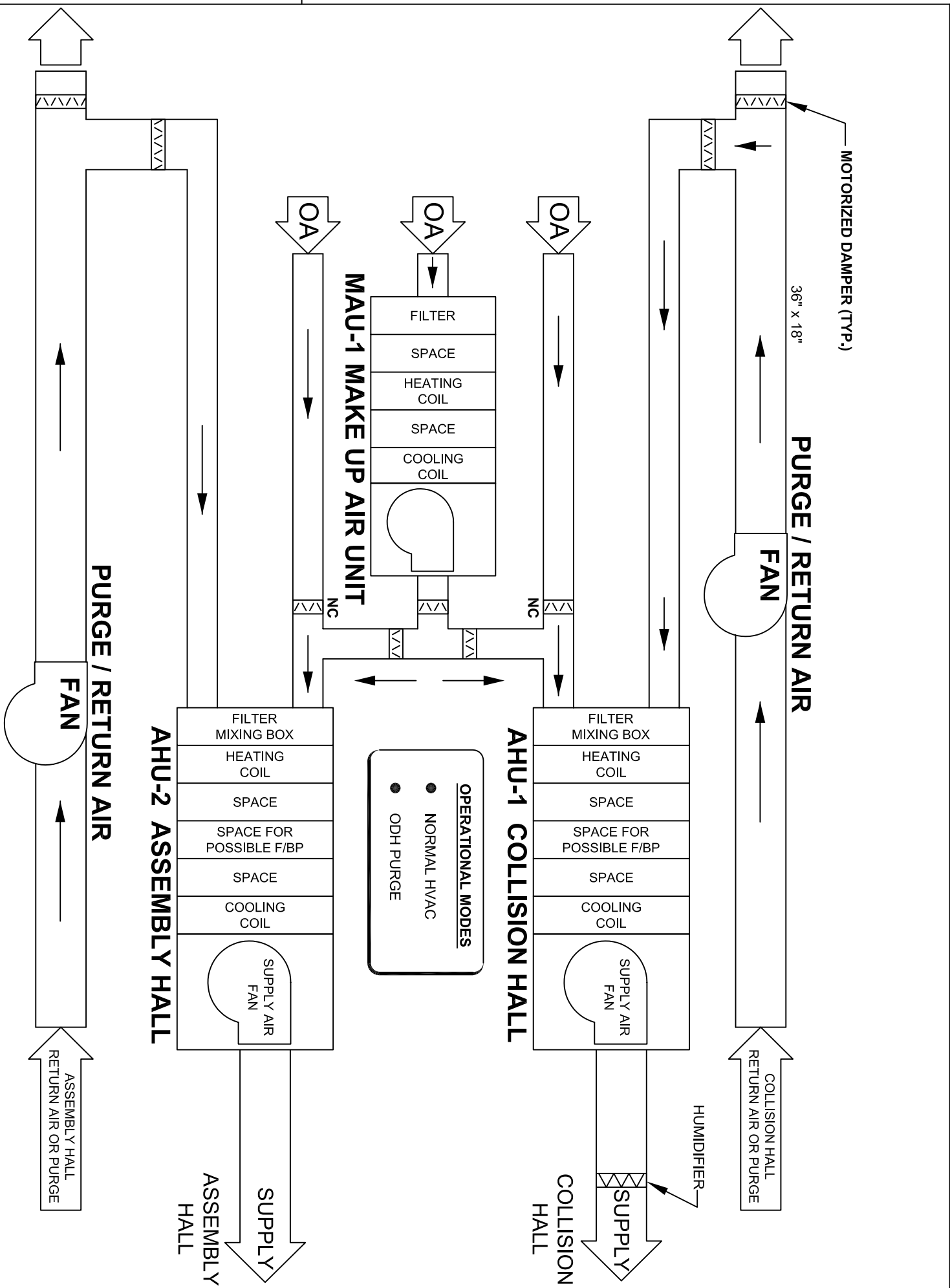
6-8-3

CD-1 REVIEW

M-6

REV.

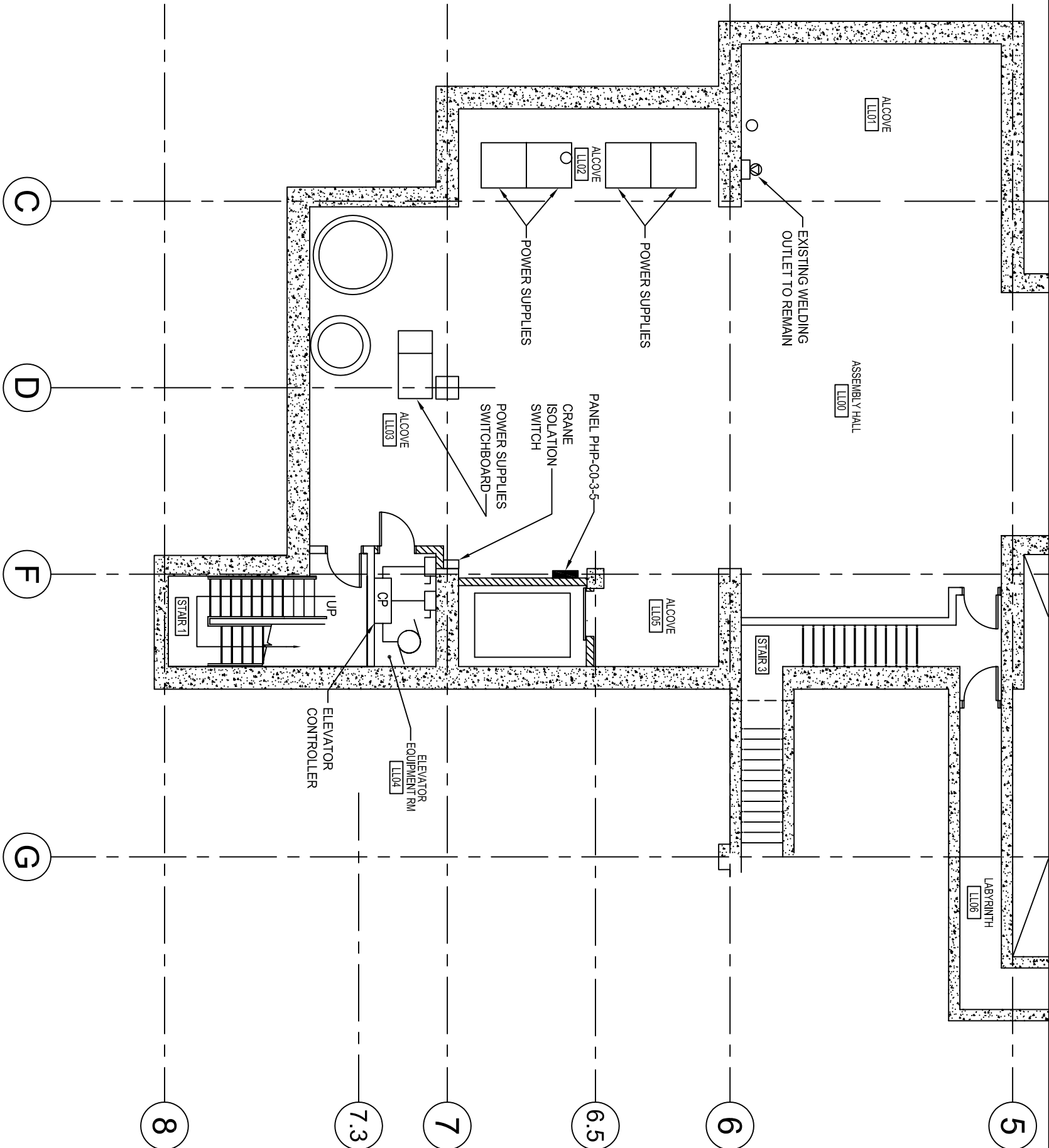




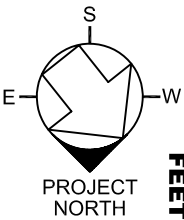
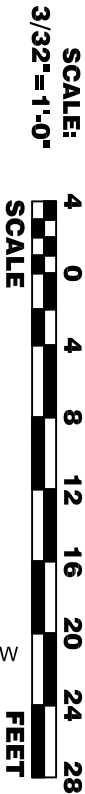
HVAC SCHEMATIC

CHW BLOCK DIAGRAM

[illegible]



ELEVATION 715'-0"

**FERMI NATIONAL ACCELERATOR LABORATORY**

UNITED STATES DEPARTMENT OF ENERGY



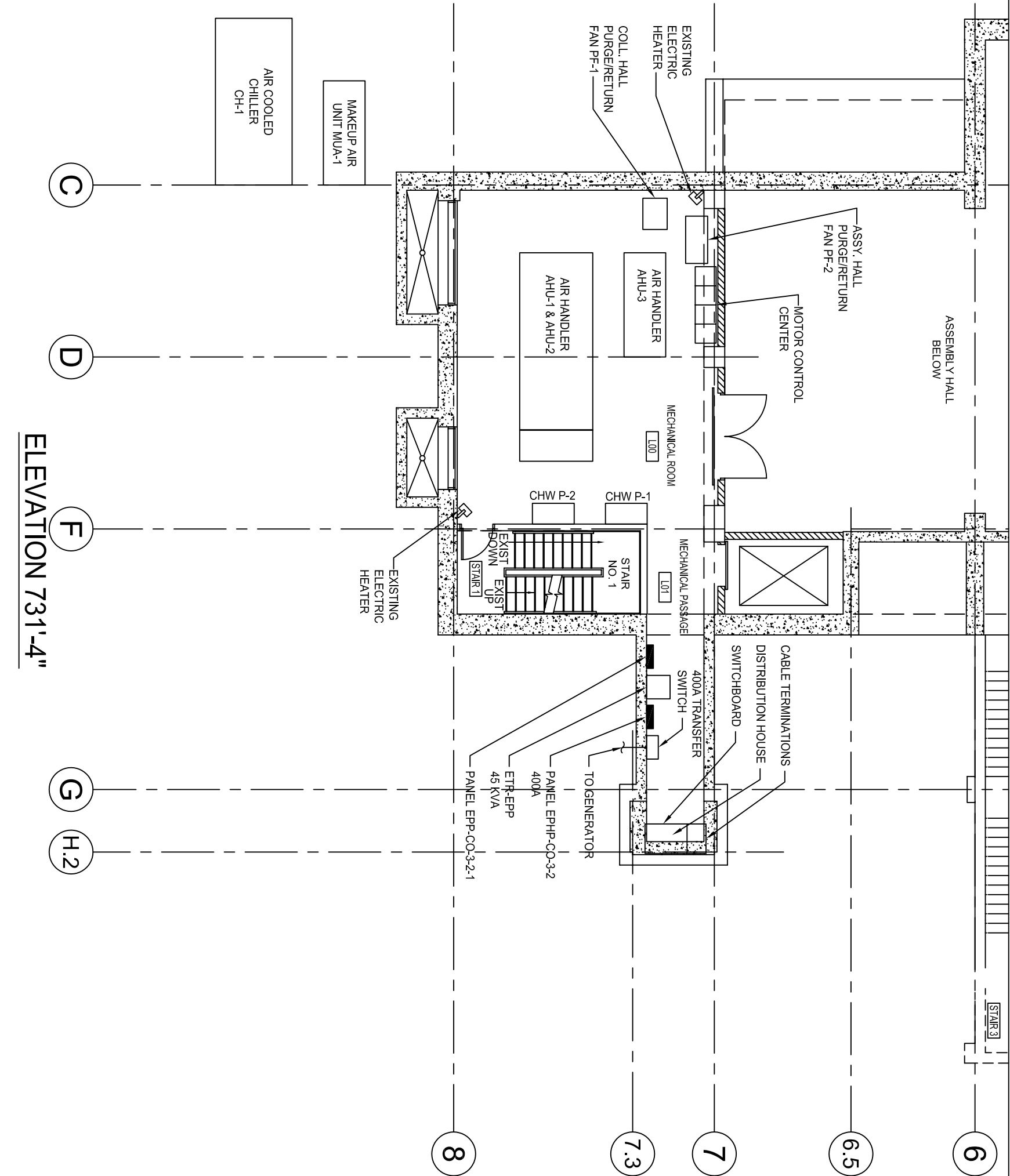
C-O OUTFITTING

ELECTRICAL - PLAN AT 715'-0"

DRAWING NO. **6-8-3**

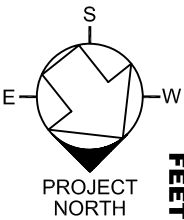
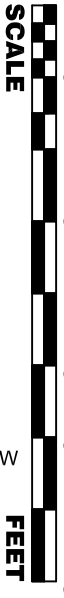
CD-1 REVIEW

REV.

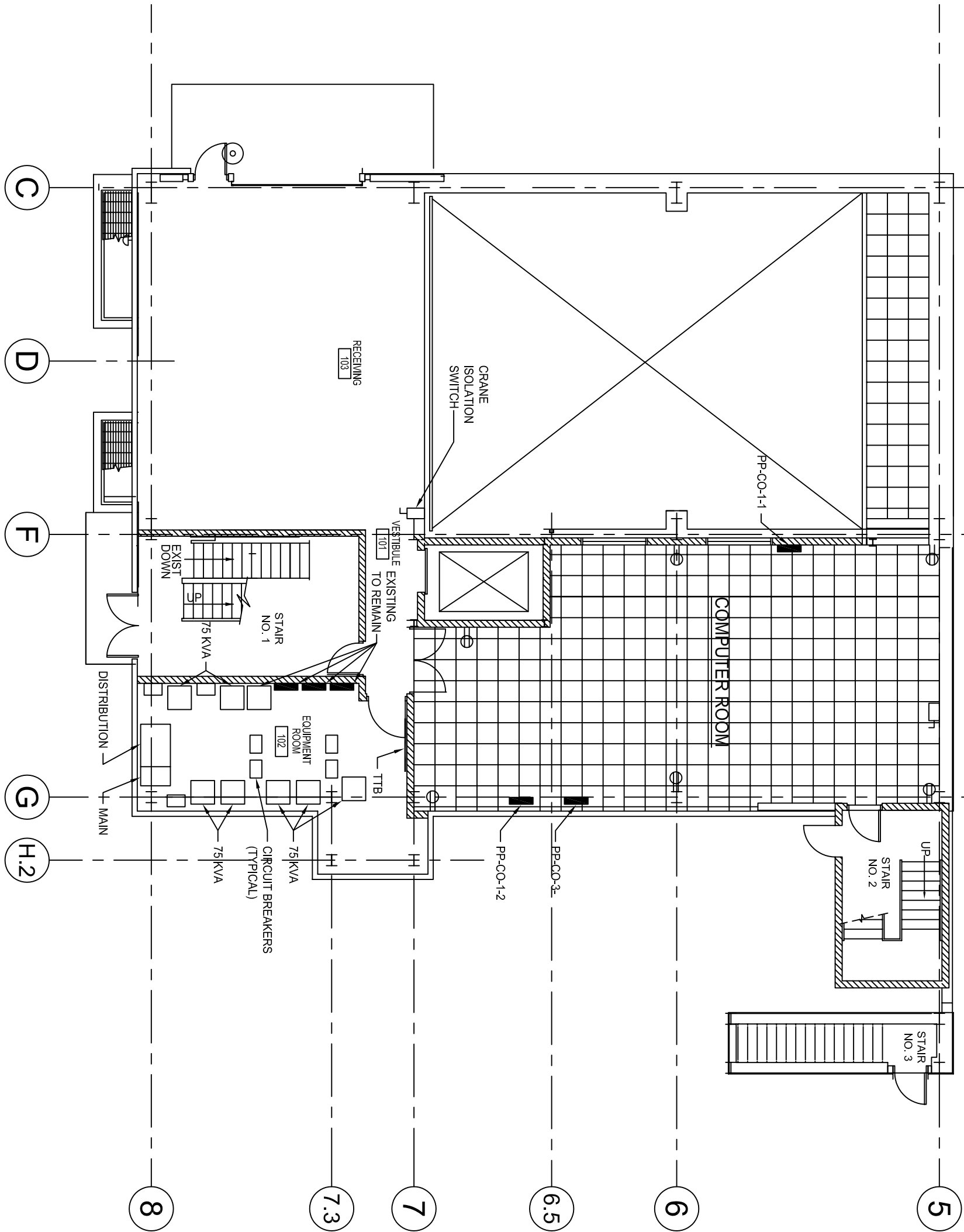


ELEVATION 731'-4"

SCALE: 3/32"=1'-0"



FERMI NATIONAL ACCELERATOR LABORATORY	
UNITED STATES DEPARTMENT OF ENERGY	
C-0 OUTFITTING	
ELECTRICAL - PLAN AT 731'-4"	
DRAWING NO. 6-8-3	CD-1 REVIEW
E-2	REV.



ELEVATION 746'-6" U.N.

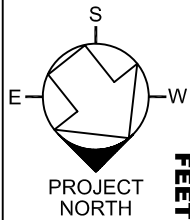
		NAME		DATE
		DESIGNED		
		DRAWN		
		CHECKED		
		APPROVED		
REV.	DATE	DESCRIPTIONS		
		REVISIONS		
		SUBMITTED		

SCALE: 3/32" = 1'-0"

SCALE **FEET**

4 0 4 8 12 16 20 24 28

W

**FERMI NATIONAL ACCELERATOR LABORATORY**

UNITED STATES DEPARTMENT OF ENERGY

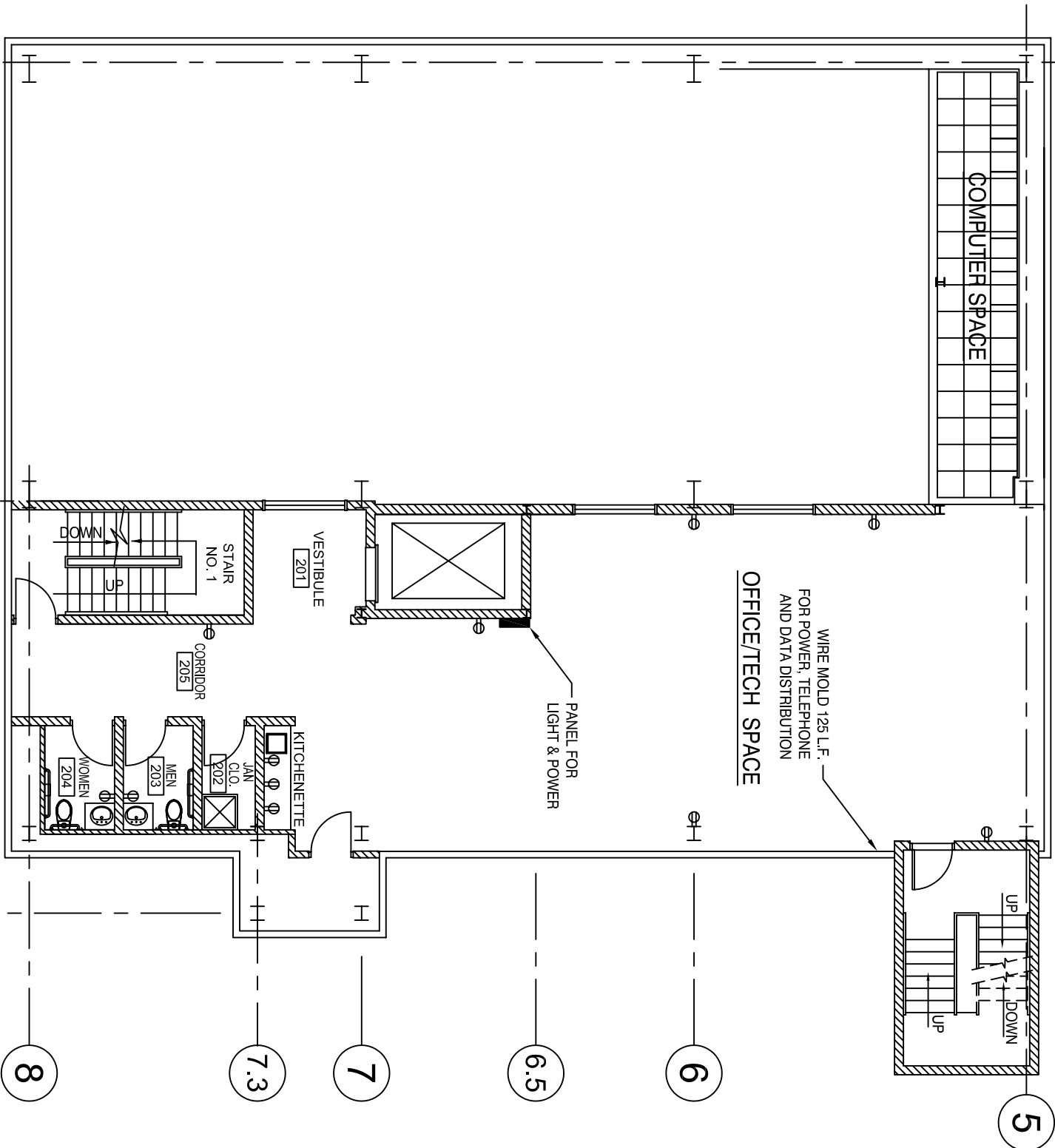
C-O OUTFITTING

ELECTRICAL - PLAN AT 746'-6"



DRAWING NO. **6-8-3**

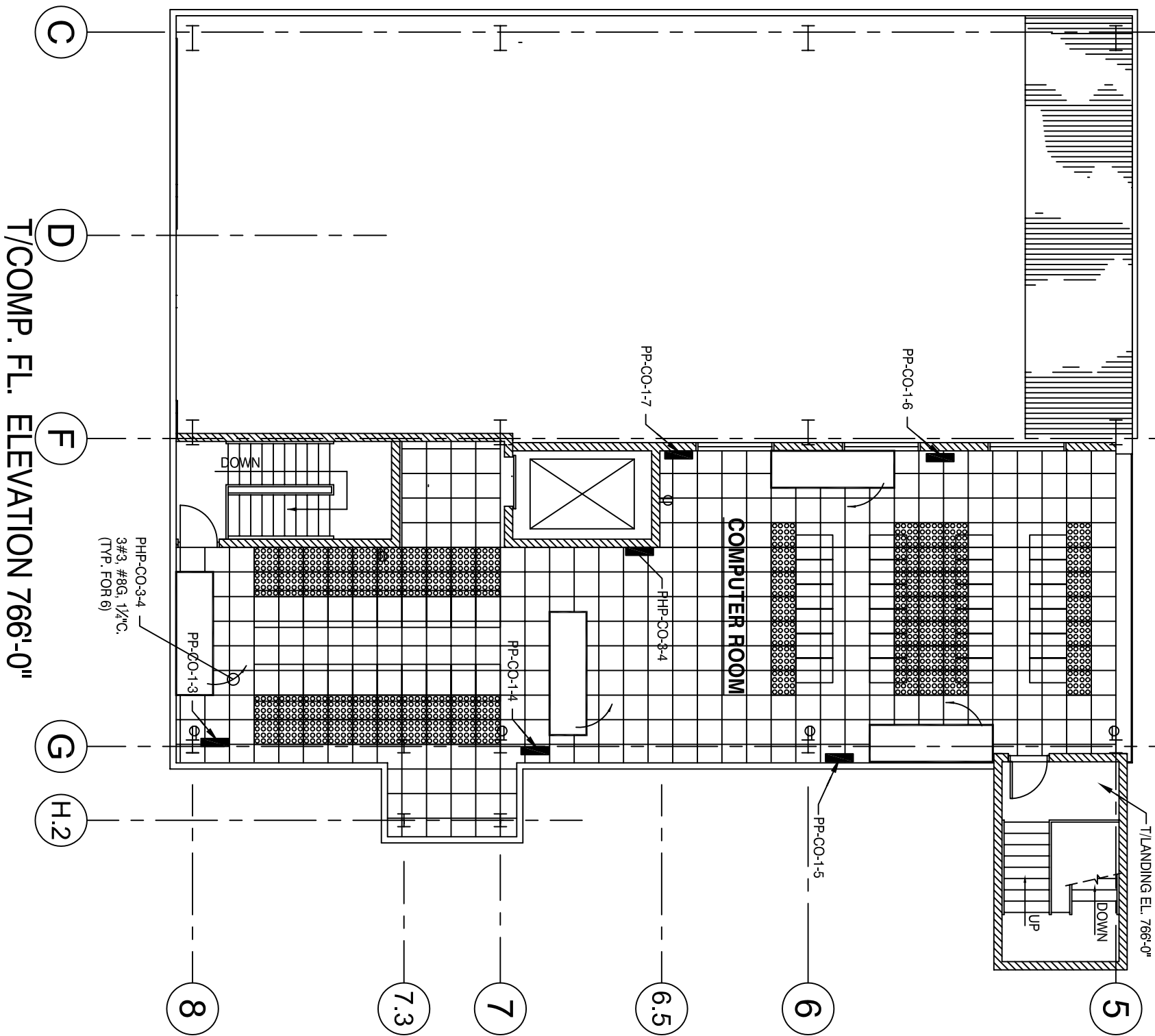
CD-1 REVIEW

REV.



T/CONC. ELEVATION 755'-4"

REV.	DATE	NAME		DATE	SCALE: 3/32" = 1'-0"	 SCALE	 PROJECT NORTH
		DESIGNED					
		DRAWN					
		CHECKED					
		APPROVED					
		SUBMITTED					
REV.	DATE	DESCRIPTIONS		REVISIONS			
					FERMI NATIONAL ACCELERATOR LABORATORY		
					UNITED STATES DEPARTMENT OF ENERGY		
					C-0 OUTFITTING		
					ELECTRICAL - PLAN AT EL. 755'-4"		
DRAWING NO.					6-8-3	CD-1 REVIEW	E-4
							REV.



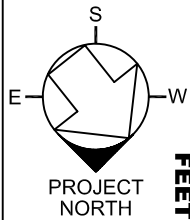
		NAME		DATE
		DESIGNED		
		DRAWN		
		CHECKED		
		APPROVED		
REV.	DATE	DESCRIPTIONS		
		REVISIONS		
		SUBMITTED		


SCALE: 3/32" = 1'-0"

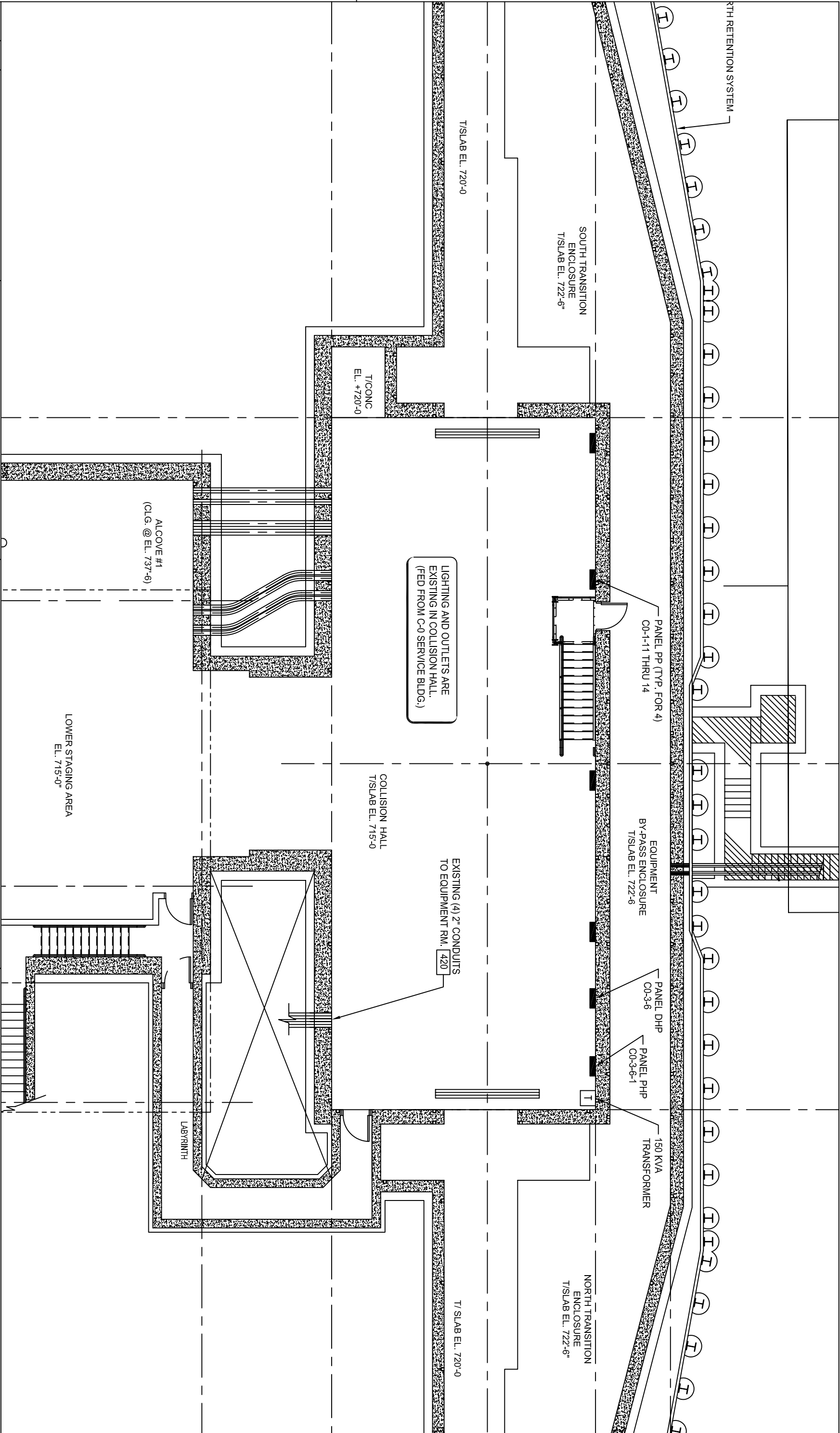
SCALE **FEET**

4 0 4 8 12 16 20 24 28

W



FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY	
	C-0 OUTFITTING ELECTRICAL - PLAN AT EL. 766'-0"
DRAWING NO. 6-8-3	CD-1 REVIEW E-5
REV.	
APRIL 2004	



		NAME		DATE	
DESIGNED					
DRAWN					
CHECKED					
APPROVED					
REV.	DATE	DESCRIPTIONS		SUBMITTED	
		REVISIONS			

SCALE: 3/32"=1'-0"

40481216202428

SCALE

FEET

S

W

PROJECT NORTH

FERMI NATIONAL ACCELERATOR LABORATORY

UNITED STATES DEPARTMENT OF ENERGY

C-0 OUTFITTING

ELECTRICAL - PLAN AT EL. 715'-0"

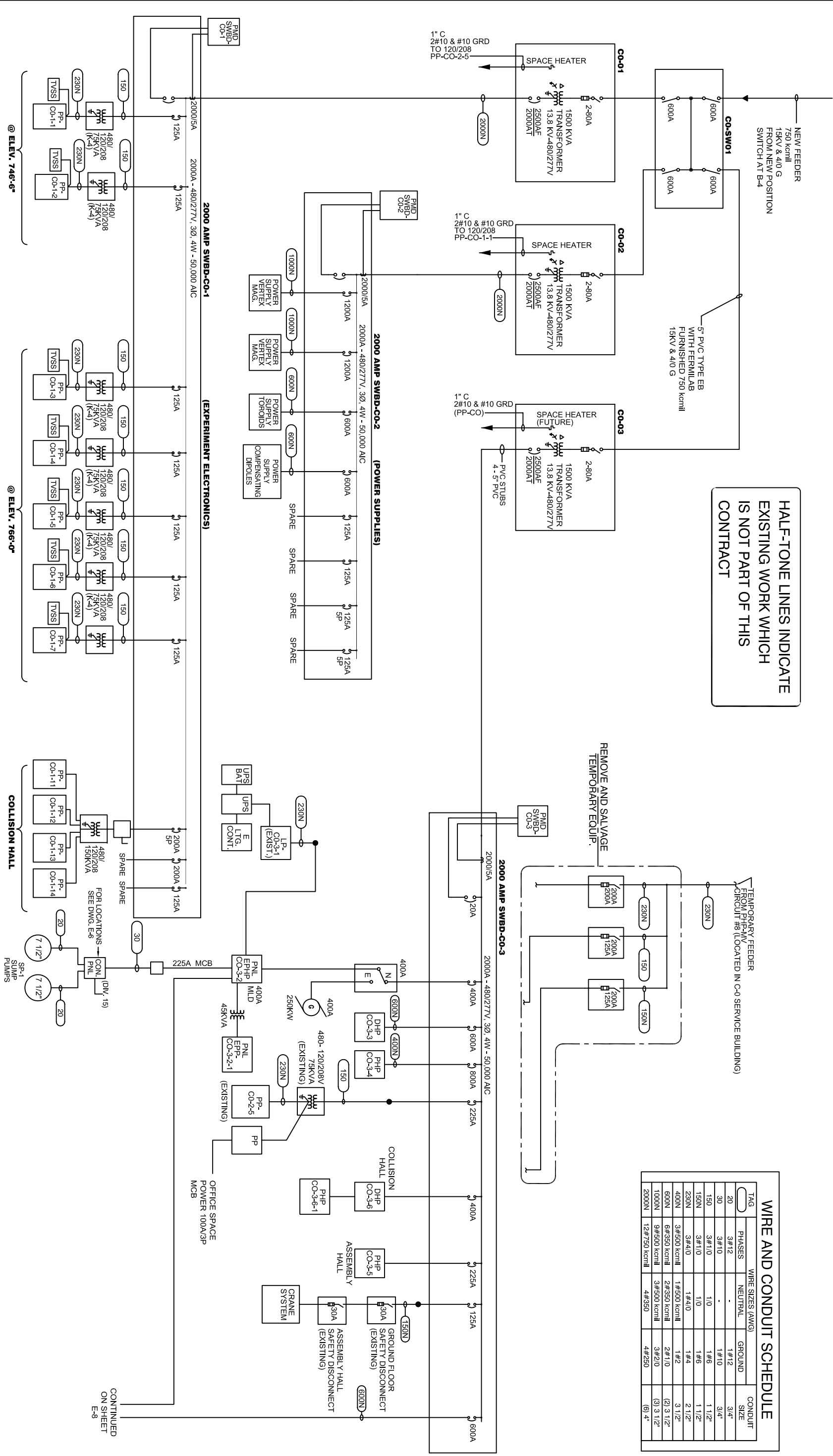
DRAWING NO. 6-8-3

CD-1 REVIEW

E-6

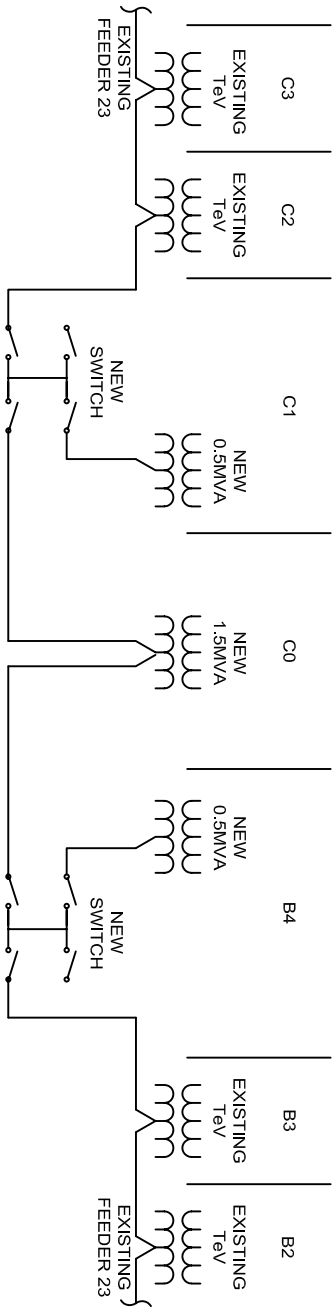
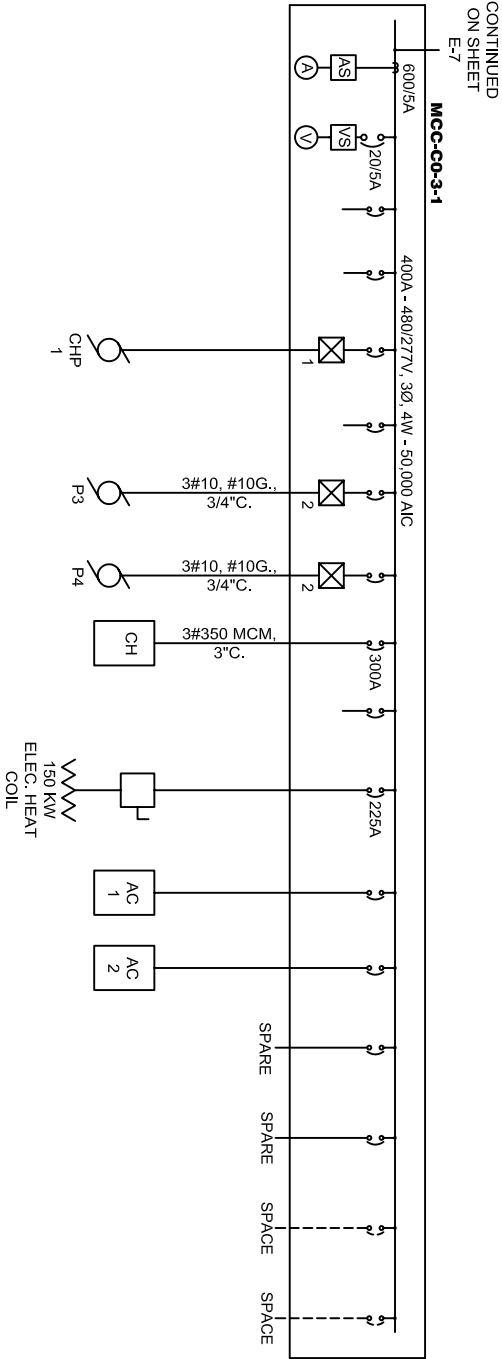
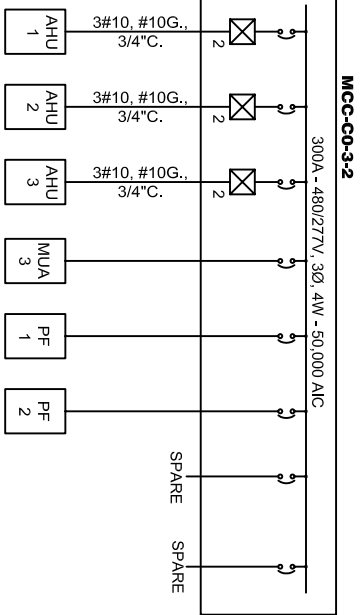
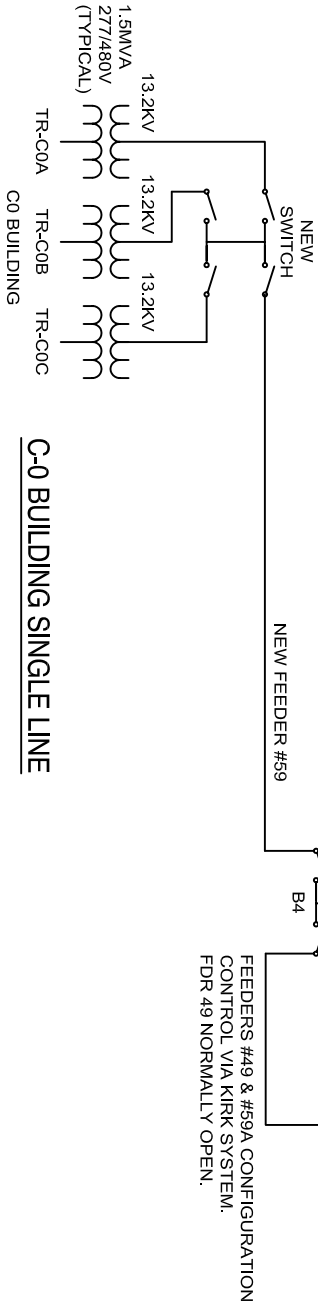
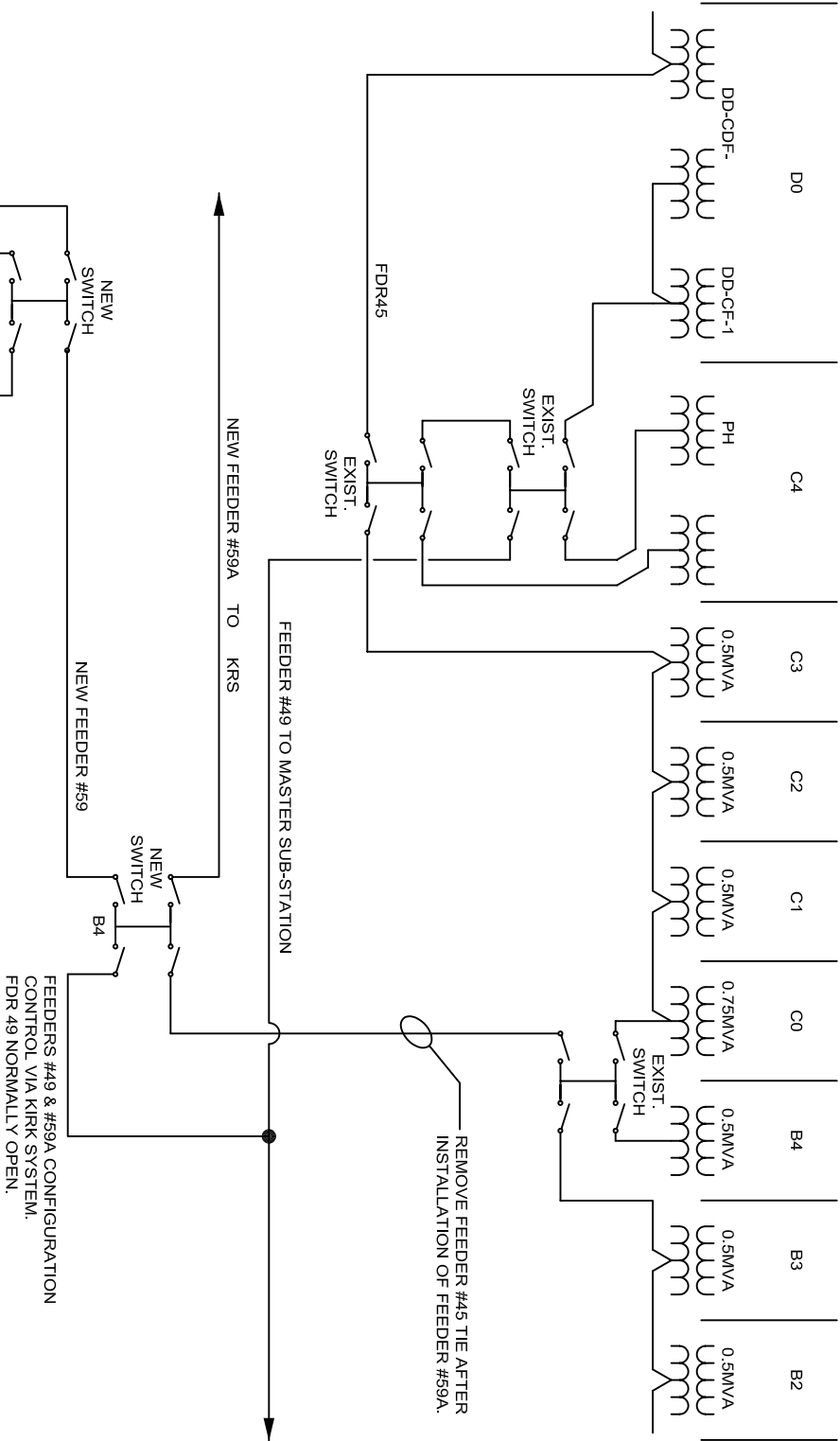
REV.

APRIL 2004



TAG	WIRE SIZES (AWG)		CONDUIT SIZE
	PHASES	NEUTRAL	
20	3 #12	-	1 #12
30	3 #10	-	1 #10
150	3 #10	1/0	1 #6
250N	3 #10	1/0	1 #6
250N	3 #4/0	1 #4/0	1 #4
400N	3 #500 kcmil	1 #500 kcmil	1 #2
600N	6 #350 kcmil	2 #350 kcmil	2 #1/0
1000N	9 #500 kcmil	3 #500 kcmil	3 #2/0
2000N	12 #750 kcmil	4 #350	4 #250
			6 4

[illegible]



NAME		DATE	
DESIGNED			
DRAWN			
CHECKED			
APPROVED			
DESCRIPTIONS			
REVISIONS			
REV.	DATE		

SCALE:	

FERMI NATIONAL ACCELERATOR LABORATORY	
UNITED STATES DEPARTMENT OF ENERGY	
C-0 OUTFITTING	
ELECTRICAL ONE-LINE DIAGRAM	
DRAWING NO.	6-8-3
CD-1 REVIEW	E-8
REV.	

This appendix contains:

- Fermilab Environmental Evaluation Form
- Fermilab Engineering Standards Manual (not Included for this review)
- Applicable Directives and Work Smart Standards (not Included for this review)
- LEED Project Checklist
- Whitestone Building and Repair Cost Reference Information
- Stakeholder Input from Comment and Compliance Review

NEPA PIF

Project/Activity Title BTeV Conventional Construction

Project Number 8-6-3

Project Initiator Joel Butler X3148

D/S Initiating Activity PARTICLE PHYSICS DIVISION OFFICE

Type Funding GPP/AIP

Total Estimated Cost 6600000

JUSTIFICATION FOR THE PROJECT

Describe the **purpose and/or need** for the project.

This project would supply infrastructure and utilities necessary to utilize the C-0 Test Area Building, completed in 1998 (Project # 8-6-2), for planned high energy physics experiments.

What are the reasonable alternatives to this project and why were they rejected? (Reasonable alternatives include the following: utilization of a different approach, process, or methodology; conducting the activity at an alternative location; or doing nothing. If inaction would prevent the fulfillment of a purpose and/or need then state this and explain.

There are no feasible alternatives to the proposed project that would accomplish the purpose and need.

DESCRIPTION OF THE PROPOSED ACTION

Provide a **narrative description** of the activity/project. The description shall focus only on physical actions to be undertaken, such as digging, trenching, demolishing, building, etc.

Theoretical or engineering explanations ARE NOT RELEVANT to this analysis. The type (s) of equipment to be used shall be included where applicable. Indicate the estimated schedule of the action. If this is new construction, *show the location of the project on an attached site map and provide a specific area map showing the limits of the project.*

This project would involve the construction of utility corridors and pads, parking lots, hardstands and two small support structures. Utilities would be trenched in from the Main Ring Road to new 1500 KVA transformers at the B-4, C-0, and C-1 service buildings. A ~700 foot long 13.8 KV feeder, including a manhole, would be run from the B-4 service building to the C-0 Test Area Building. A new 13.8 KVA feeder would be pulled through existing ducts from the Kautz Road substation to the Main Ring Road utilities. Three transformers, an emergency generator, two chillers and two condensers would be placed on new pads in the vicinity of the C-0 Test Area Building. A small gas shed and a service building would be constructed on shallow footers. New hardstand would be constructed to accommodate the support buildings and staging areas. The existing maintenance road would be extended ~200 ft. to intersect E Road, and the existing hardstand parking lot and service drive would be paved.

Describe the **magnitude of the project**. Provide as much quantitative information as possible

relevant to the overall impact of the project on the environment. (For example, what is the area of a new building, length of utility lines to be installed, the volume of soil to be excavated, volume and character of effluent(s), magnitude of radioactivity, etc.)

All excavation would be minor in nature. Shallow footers would require <100 cu. yd. of excess spoil. Excavations for the feeder lines will generate little or no spoils, because soil will be used for backfilling. Any excess suitable soils would be taken to a stockpile on site. Non-suitable materials would be taken off site for disposal. The area of the gas shed would be ~150 sq. ft., and the new service building ~750 sq. ft. The extension of the maintenance road would require ~1200 sq. ft. of new paving. New hardstands would be ~6000 sq. ft.

POTENTIAL ENVIRONMENTAL EFFECTS

Please check items that apply. **Include a detailed explanation of all items checked.**

Will the proposed action change or cause disturbance to the following resources?

Will the proposed action involve any of the following regulated substances or activities?

- Clearing or Excavation (The following information will also be needed on the PIF: the estimated area to be affected, the volume of spoils, the expected disposition of spoils, and the soil erosion control measures to be utilized.)
- Chemical use or storage (If the action involves excavation, determine whether the location was ever used for chemical dispensing, was a waste or product storage area, or has been the site of any chemical spills. Also, find out if the proposed location is near one of Fermilab's 5 RCRA Solid Waste Management Units.)
- Radiation exposures or radioactive air emissions

Other relevant disclosures

Comments

Excavation -- see magnitude section above.

Chemical Storage -- standard gases (nitrogen, helium, ethane/argon) would be stored in the gas shed. None of the gases are flammable.

Radiation exposure -- a portion of the work would be accomplished in a controlled area. All workers in this area will be required to have had Rad Worker training. No radioactive air emissions are anticipated.

DEC 23 2003

FAO
Cooper/mb

12/23/03

FAO
Lutha

12/ /03

FAO
Miller

12/ 23 /03

FAO
Monhart

12/ 23 /03

Mr. Gerald Brown, Associate
Director for Operations Support
Fermilab
P.O. Box 500
Batavia, IL 60510

Dear Mr. Brown:

SUBJECT: NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) DETERMINATION AT
FERMI NATIONAL ACCELERATOR LABORATORY - "BTev PROJECT"

Reference: Letter, G. Brown to J. Monhart, dated December 12, 2003, Subject: Same As
Above

I have reviewed the Fermilab Environmental Evaluation Notification Form (EENF) for the
subject proposed project transmitted by your referenced letter. Based on the information
provided in the EENF, I have approved the following project as a categorical exclusion (CX):

<u>Project Name</u>	<u>Approved</u>	<u>CX (s)</u>
BTev Project	12/23/2003	B1.15, B3.10

I am returning a signed copy of the EENF for your records. No further NEPA review is
required. This project falls under a categorical exclusion(s) provided in 10 CFR 1021, as
amended in 1996.

Sincerely,
Original signed by
Jane L. Monhart
Area Manager

Jane L. Monhart
Area Manager

Enclosure:
Signed EENF

cc: M. Witherell, w/o encl.
K. Stanfield, w/o encl.
B. Chrisman, w/o encl.
C. Trimby, w/o encl.
cc: J. Butler, PPD, w/encl.
B. Griffing, ESHS, w/encl.
T. Dykhuis, ESHS, w/o encl.
bc: P. Siebach, TS-STs, w/encl.
V. Prouty, OCC-GL, w/o encl.

S:CX-BTev.12-03.jc

File: ENV-7

FERMILAB ENVIRONMENTAL EVALUATION NOTIFICATION FORM

Project/Activity Title: BTeV Project

ES&H Tracking Number: 01038

Funding Source: Major Item of Equipment

Fermilab Project Manager: Joel Butler

Signature

Joel Butler

Date

Dec. 12, 2003

Fermilab NEPA Reviewer: Teri Dykhuis

Signature

Teri L. Dykhuis

Date

12/12/03

I. Description of the Proposed Action

The proposed BTeV Project would include building and installing a new detector in the C-Zero Hall of the Tevatron Collider. The BTeV project would consist of three subprojects: the BTeV Detector, Interaction Region, and the C-Zero Outfitting.

The BTeV Detector would consist of a large analysis dipole magnet; a silicon pixel vertex detector; a forward tracker consisting of silicon microstrip detectors close to the beams and straw tube chambers far from the beam; a Ring Imaging Cherenkov counter (RICH) for particle identification; an electromagnetic calorimeter to reconstruct photons and measure their momenta and angles; and a muon detector. The BTeV Detector would also include a state of the art trigger system that can analyze every beam crossing of the Tevatron and select events with evidence of particles containing *b*-quarks that decay downstream of the main interaction vertex and a high speed high capacity data acquisition system capable of recording all events containing these *b*-quarks.

The Interaction Region subproject will modify the accelerator to produce high luminosity at the C-Zero interaction region.

The C-Zero Outfitting subproject would supply infrastructure and utilities necessary to utilize the C-0 Test Area Building, which was completed in 1998 (Project # 8-6-2), for planned high energy physics experiments.

This subproject would involve the construction of utility corridors and pads, parking lots, hardstands and two small support structures. Utilities would be trenched in from the Main Ring Road to new 1500 KVA transformers at the B-4, C-Zero, and C-One service buildings. An approximate 700 feet long 13.8 KV feeder, including a manhole, would be run from the B-Four service building to the C-Zero Test Area Building. A new 13.8 KVA feeder would be pulled through existing ducts from the Kautz Road substation to the Main Ring Road utilities. Three transformers, an emergency generator, two chillers and two condensers would be placed on new pads in the vicinity of the C-Zero Test Area Building. A small gas shed and a service building would be constructed on shallow footers. New hardstand would be constructed to accommodate the support buildings and staging areas. The existing maintenance road would be extended approximately 200 feet to intersect E Road, and the existing hardstand parking lot and service drive would be paved. In addition, internal modifications would be made to the C-Zero Test Area Building to accommodate the BTeV experiment.

There are no feasible alternatives to the proposed project that would accomplish the purpose and need.

II. Description of the Affected Environment

All excavation would be minor in nature. Shallow footers would require less than 100 cubic yards of excess spoil. Excavations for the feeder lines will generate little or no spoils, because soil will be used for backfilling. Any excess suitable soils would be taken to a stockpile on site. Non-suitable materials would be taken off site for disposal. The area of the gas shed would be approximately 150 square feet, and the new service building would be approximately 750 square feet. The extension of the maintenance road would require approximately 1200 square feet of new paving. New hardstands would be approximately 6000 square feet.

III. Potential Environmental Effects (Provide comments for each checked item and where clarification is necessary.)

- A. Sensitive Resources: Will the proposed action result in changes and/or disturbances to any of the following resources?

- ☐ Threatened or endangered species
- ☐ Other protected species
- ☐ Wetland/Floodplains
- ☐ Archaeological or historical resources
- ☐ Non-attainment areas

- B. Regulated Substances/Activities: Will the proposed action involve any of the following regulated substances or activities?

- ☒ Clearing or Excavation
- ☐ Demolition or decommissioning
- ☐ Asbestos removal
- ☐ PCBs
- ☐ Chemical use or storage
- ☐ Pesticides
- ☐ Air emissions
- ☐ Liquid effluents
- ☐ Underground storage tanks
- ☐ Hazardous or other regulated waste (including radioactive or mixed)
- ☒ Radioactive exposures or radioactive air emissions
- ☐ Radioactivation of soil or groundwater

- C. Other relevant Disclosures

- ☐ Threatened violation of ES&H permit requirements
- ☐ Siting/construction/major modification of waste recovery or TSD facilities
- ☐ Disturbance of pre-existing contamination
- ☐ New or modified permits
- ☐ Public controversy
- ☐ Action/involvement of another federal agency
- ☐ Public utilities/services
- ☐ Depletion of a non-renewable resource

IV. NEPA Recommendation

Fermilab has reviewed this proposed action and concluded that the appropriate level of NEPA determination is a Categorical Exclusion. The conclusion is based on the proposed action meeting the applicable requirements in DOE's NEPA Implementation Procedures, 10 CFR 1021, Subpart D, Appendix B3.10 and B1.15.

V. DOE/CH-FAO NEPA Coordinator Review

Concurrence with the recommendation for determination:

NEPA Coordinator reviewer Jonathan P. Cooper

Signature Jonathan P. Cooper

Date 12/23/03

Fermi Area Manager Jane L. Monhart

Signature Jane L. Monhart

Date 12/23/03

VI. Comments on checked items in section III.

Excavation

See description of C-Zero Outfitting above.

Radiation exposure

A portion of the work would be accomplished in a controlled area. All workers in this area would be required to have received Radiation Worker training. No radioactive air emissions are anticipated.



Project Checklist

Project

Yes ? No

1 1 12 Sustainable Sites

Y		
X		
		X
		X
		X
	X	
		X
		X
		X
		X
		X
		X
		X
		X
		X
		X

- Prereq 1 **Erosion & Sedimentation Control**
- Credit 1 **Site Selection**
- Credit 2 **Urban Redevelopment**
- Credit 3 **Brownfield Redevelopment**
- Credit 4.1 **Alternative Transportation**, Public Transportation Access
- Credit 4.2 **Alternative Transportation**, Bicycle Storage & Changing Rooms
- Credit 4.3 **Alternative Transportation**, Alternative Fuel Vehicles
- Credit 4.4 **Alternative Transportation**, Parking Capacity
- Credit 5.1 **Reduced Site Disturbance**, Protect or Restore Open Space
- Credit 5.2 **Reduced Site Disturbance**, Development Footprint
- Credit 6.1 **Stormwater Management**, Rate and Quantity
- Credit 6.2 **Stormwater Management**, Treatment
- Credit 7.1 **Landscape & Exterior Design to Reduce Heat Islands**, Non-Roof
- Credit 7.2 **Landscape & Exterior Design to Reduce Heat Islands**, Roof
- Credit 8 **Light Pollution Reduction**

Yes ? No

3 2 Water Efficiency

X		
X		
		X
X		
		X

- Credit 1.1 **Water Efficient Landscaping**, Reduce by 50%
- Credit 1.2 **Water Efficient Landscaping**, No Potable Use or No Irrigation
- Credit 2 **Innovative Wastewater Technologies**
- Credit 3.1 **Water Use Reduction**, 20% Reduction
- Credit 3.2 **Water Use Reduction**, 30% Reduction

Yes ? No

4 13 Energy & Atmosphere

Y		
Y		
Y		
X		
X		
X		
		X
		X
		X
		X
		X
		X
		X
		X
		X
		X
		X
		X
		X

- Prereq 1 **Fundamental Building Systems Commissioning**
- Prereq 2 **Minimum Energy Performance**
- Prereq 3 **CFC Reduction in HVAC&R Equipment**
- Credit 1 **Optimize Energy Performance**, 15% New / 5% Existing
- Optimize Energy Performance**, 20% New / 10% Existing
- Optimize Energy Performance**, 25% New / 15% Existing
- Optimize Energy Performance**, 30% New / 20% Existing
- Optimize Energy Performance**, 35% New / 25% Existing
- Optimize Energy Performance**, 40% New / 30% Existing
- Optimize Energy Performance**, 45% New / 35% Existing
- Optimize Energy Performance**, 50% New / 40% Existing
- Optimize Energy Performance**, 55% New / 45% Existing
- Optimize Energy Performance**, 60% New / 50% Existing
- Credit 2.1 **Renewable Energy**, 5%
- Credit 2.2 **Renewable Energy**, 10%
- Credit 2.3 **Renewable Energy**, 20%

		X
		X
X		
		X

Credit 3

Additional Commissioning

Credit 4

Ozone Depletion

Credit 5

Measurement & Verification

Credit 6

Green Power

Yes ? No

7 6 Materials & Resources

Y		
X		
X		
		X
X		
		X
X		
		X
X		
X		
X		
		X
		X
		X

Yes ? No

- Prereq 1 **Storage & Collection of Recyclables**
- Credit 1.1 **Building Reuse**, Maintain 75% of Existing Shell
- Credit 1.2 **Building Reuse**, Maintain 100% of Shell
- Credit 1.3 **Building Reuse**, Maintain 100% Shell & 50% Non-Shell
- Credit 2.1 **Construction Waste Management**, Divert 50%
- Credit 2.2 **Construction Waste Management**, Divert 75%
- Credit 3.1 **Resource Reuse**, Specify 5%
- Credit 3.2 **Resource Reuse**, Specify 10%
- Credit 4.1 **Recycled Content**, Specify 5% (p.c. + 1/2 p.i.)
- Credit 4.2 **Recycled Content**, Specify 10% (p.c. + 1/2 p.i.)
- Credit 5.1 **Local/Regional Materials**, 20% Manufactured Locally
- Credit 5.2 **Local/Regional Materials**, of 20% Above, 50% Harvested Locally
- Credit 6 **Rapidly Renewable Materials**
- Credit 7 **Certified Wood**

8 1 6 Indoor Environmental Quality

Y		
Y		
		X
X		
X		
X		
X		
X		
	X	
X		
		X
X		
X		
		X
		X
		X
		X

Yes ? No

- Prereq 1 **Minimum IAQ Performance**
- Prereq 2 **Environmental Tobacco Smoke (ETS) Control**
- Credit 1 **Carbon Dioxide (CO₂) Monitoring**
- Credit 2 **Ventilation Effectiveness**
- Credit 3.1 **Construction IAQ Management Plan**, During Construction
- Credit 3.2 **Construction IAQ Management Plan**, Before Occupancy
- Credit 4.1 **Low-Emitting Materials**, Adhesives & Sealants
- Credit 4.2 **Low-Emitting Materials**, Paints
- Credit 4.3 **Low-Emitting Materials**, Carpet
- Credit 4.4 **Low-Emitting Materials**, Composite Wood
- Credit 5 **Indoor Chemical & Pollutant Source Control**
- Credit 6.1 **Controllability of Systems**, Perimeter
- Credit 6.2 **Controllability of Systems**, Non-Perimeter
- Credit 7.1 **Thermal Comfort**, Comply with ASHRAE 55-1992
- Credit 7.2 **Thermal Comfort**, Permanent Monitoring System
- Credit 8.1 **Daylight & Views**, Daylight 75% of Spaces
- Credit 8.2 **Daylight & Views**, Views for 90% of Spaces

5 Innovation & Design Process

		X
		X
		X
		X
		X

Yes ? No

- Credit 1.1 **Innovation in Design**: Specific Title
- Credit 1.2 **Innovation in Design**: Specific Title
- Credit 1.3 **Innovation in Design**: Specific Title
- Credit 1.4 **Innovation in Design**: Specific Title
- Credit 2 **LEED™ Accredited Professional**

23 2 44 Project Totals

Certified 26-32 points **Silver** 33-38 points **Gold** 39-51 points **Platinum** 52-69 points

t Name: BTeV

14 Points

Required

- 1
- 1
- 1
- 1
- 1
- 1
- 1
- 1
- 1
- 1
- 1
- 1
- 1
- 1
- 1

5 Points

- 1
- 1
- 1
- 1
- 1

17 Points

Required

Required

Required

- 1
- 1
- 1
- 1
- 1
- 1
- 1
- 1
- 1
- 1
- 1
- 1
- 1
- 1
- 1

1
1
1
1

13 Points

Required

- 1
- 1
- 1
- 1
- 1
- 1
- 1
- 1
- 1
- 1
- 1
- 1
- 1
- 1

15 Points

Required

Required

- 1
- 1
- 1
- 1
- 1
- 1
- 1
- 1
- 1
- 1
- 1
- 1
- 1
- 1
- 1
- 1

5 Points

- 1
- 1
- 1
- 1
- 1

69 Points

2. Building M&R Cost Profiles

This chapter presents estimates of 50-year maintenance cost profiles for 50 building models. Each two-page profile includes a description of the model building, a list of major components, and forecasts of maintenance and repair (M&R) costs at various levels of aggregation. The profile estimates were made with the Whitestone MARS forecast system, calibrated for the Washington DC metropolitan area. The profiles can be adjusted for other metro areas using the Local Maintenance Cost Index shown in Chapter 3, and modified to include different components shown in Chapter 5.

Table 2-1
Summary of M&R Cost Profiles

Building Type	Gross Sqft.	Annual M&R Cost per Gsft.*	Annual M&R Cost as % of Repl. Value
Car Wash	800	\$10.00	4.90%
Garage, Service Station	1,400	7.36	6.40
Apartments 1-3 story	22,500	6.53	6.64
Apartments 4-7 story	60,000	6.27	6.27
Motel	8,000	6.06	6.58
Fire Station	6,000	5.61	5.66
Restaurant, Fast Food	4,000	5.53	4.91
Bank	4,100	5.43	3.56
Telephone Exchange	5,000	5.12	4.92
Motel, 40 Unit	18,000	5.03	4.86
Laundromat	3,000	5.03	4.36
Restaurant, Large	10,000	4.99	4.17
Club, Country	6,000	4.81	3.69
Religious Education	10,000	4.77	4.53
Warehouse, Self-storage	24,000	4.45	7.18
Medical Clinic	13,000	4.17	2.51
Movie Theater	10,000	4.12	3.96
Store, Convenience	4,000	4.10	5.77
Community Center	10,000	4.09	4.34
Hospital, General	125,000	4.08	3.37
Hospital, Research	540,200	4.05	1.53
Dormitory, 50 Room	25,000	4.04	4.93
Bus Terminal	12,000	3.82	4.21
Store, Retail	8,000	3.80	5.14
Funeral Home	10,000	3.76	4.43
Town Hall, 1 Story	11,000	3.66	4.26
Church	17,000	3.60	3.20
Court House 1 Story	30,000	3.52	2.74
Post Office	13,000	3.51	4.28
Auditorium	24,000	3.48	3.34
Public Library, 3 Story	60,000	3.40	3.26
College Student Union	25,000	3.35	3.32
Apartments, 24 Story	220,000	3.17	4.11
Club, Social	22,000	3.15	3.41
Gymnasium	40,000	3.07	3.39
Hockey Rink	30,000	2.94	2.77
College Classroom	90,000	2.89	2.84
Elementary School	47,000	2.81	4.06
Childcare Center	12,000	2.71	2.43
Bowling Center	20,000	2.59	4.13
Garage, Auto Sales	21,000	2.56	3.78
County Jail	318,455	2.46	0.65
Light Manufacturing Plant	45,000	2.37	4.19
Office Park	65,000	2.27	4.92
Supermarket	96,000	2.20	3.25
Department Store	94,000	2.15	3.28
Office Building, 2 Story	83,000	2.04	2.29
Office Building, 15 Story	250,000	1.90	1.65
Aircraft Hangar	32,000	1.86	2.45
Warehouse, Large	80,000	1.80	4.02

*Average costs over 50-year lifetime, Washington DC metro area

From the cost analysts perspective, the most useful information in these profiles is probably the year-by-year total shown under the "Cost per Sqft. by System" section. A projection of M&R costs is required in the financial evaluation of virtually all large construction or renovation projects. Often this trend is estimated with a simple approximation (2 to 4 percent of replacement value is common) that obscures the actual oscillations in M&R requirements, and misstates costs when expressed in terms of present value. In comparison, Whitestone estimates are based on component life cycles that provide a more realistic and defensible projection of M&R costs.

For the purposes of the facility manager, average values for M&R costs may be more useful than detailed year-to-year estimates. Conversations about facility funding and budgeting usually dwell on average costs per square foot, or average costs as a percentage of replacement value. Among our building models, the highest average cost per gsft. was for the car wash (\$10.00), while the warehouse model had the lowest average cost (\$1.80).

The reader may note the rankings in order of cost are different when expressed in terms of replacement value. The highest average M&R cost from this perspective was for the self-storage warehouse—7.18 percent of replacement value—a result due primarily to a low estimated replacement cost of \$62 per square foot. A complete list of replacement costs is shown in the Appendix. In general, we are wary of costs expressed in terms of replacement values because of the great variation in new construction costs and the difficulty of determining replacement costs for older buildings.

Profile estimates are sensitive to a variety of factors such as unscheduled maintenance rates, in-house shop rates, and types of utilization. These sensitivities are discussed in Chapter 6, Definitions and Methods.

Community Center

Gross Sqft:	10,000
Height ft.:	12
Exterior:	Brick Veneer
Floor Coverings:	Carpet/Vinyl Tile
HVAC:	Electric Cool, Gas Heat, Singlezone Unit
Occupancy:	600
Replacement Cost:	\$942,102

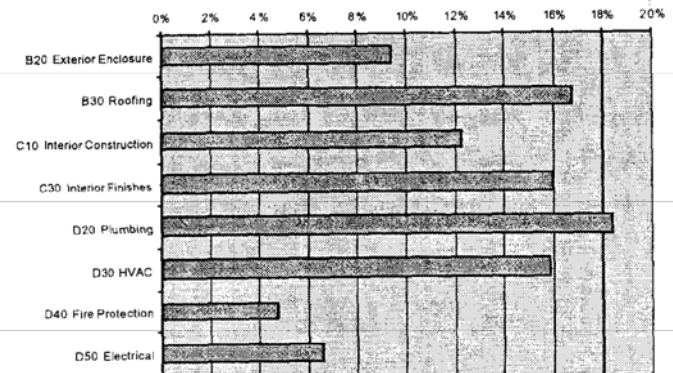
50-Year M&R Cost Summary

Cost (\$2002)	50 Year Total	Annual Cost per Sqft.	Annual Cost as % Repl. Cost
PM & Minor Repair	\$395,039	\$0.79	0.84%
Unscheduled Maintenance	\$454,055	\$0.91	0.96%
Renewal & Replacement	<u>\$1,193,972</u>	<u>\$2.39</u>	<u>2.53%</u>
Total M&R Costs	\$2,043,066	\$4.09	4.34%

Components

Uniformat / Component	Quantity	Units
B20 Exterior Enclosure		
Clay Brick, Exterior, 1st Floor	4349	Sq Ft
Steel Frame, Painted, Operable Window, 12 sf, 1st Floor	3	Each
Aluminum Frame, Fully Glazed, Exterior Door	4	Each
B30 Roofing		
Concrete Steps	100	Sq Ft
Concrete Decking	400	Sq Ft
Built-up Roof	10000	Sq Ft
C10 Interior Construction		
Steel, Painted, Interior Door	72	Each
C30 Interior Finishes		
Sheetrock, Stippled, Interior Wall Finish	17160	Sq Ft
Vinyl Tile Flooring	5000	Sq Ft
Carpet, Nylon 20 oz., High Traffic	5000	Sq Ft
Acoustical Tile Ceiling	10000	Sq Ft
D20 Plumbing		
Tankless Water Closet	6	Each
Urinal, Vitreous China	2	Each
Lavatory, Vitreous China	7	Each
Sink, Stainless Steel	4	Each
Drinking Fountain, Refrigerated	3	Each
Pipe & Fittings, 3/4" Copper, Cold Water	0.79	K Ln Ft
Pipe & Fittings, 4" Steel	0.9	K Ln Ft
Pipe & Fittings, 2" Copper, Cold Water	0.835	K Ln Ft
Pipe & Fittings, 3/4" Copper, Hot Water	0.35	K Ln Ft
Pipe Insulation, Cold Water	1.24	K Ln Ft
Pipe Insulation, Hot Water	0.6	K Ln Ft
Water Heater, Gas/Oil 175 Gph	2	Each
Pipe & Fittings, 6" Cast Iron	0.43	K Ln Ft
Pipe & Fittings, 10" Cast Iron	0.2	K Ln Ft
Pipe & Fittings, 4" DWV PVC	0.145	K Ln Ft
Roof Drain, 2"	4	Each
Aluminum Gutter, Downspouts, Fittings	0.453	K Ln Ft
D30 HVAC		
Exhaust Fan, Ceiling, 200-500 Cfm	4	Each
Air Conditioner, Rooftop, 50 Ton	1	Each
D40 Fire Protection		
Fire Sprinkler System	1	Each
Fire Sprinkler Head	71	Each
D50 Electrical		
Safety Switch, Fused, 400 Amp., 3 Ph.	1	Each
Main Switchgear, <1200 Amp.	1	Each
Distribution Panel Board	2	Each
Emergency Horn & Siren	5	Each
Exit Lighting Fixture, w/ Battery	4	Each
Incandescent Lighting Fixture, Basic, 100w	60	Each
Fluorescent Lighting Fixture, 160w	60	Each
Wiring Device, Switch	30	Each
Receptacle, 120V, 15 Amp	25	Each
TV Cable Outlet	1	Each
Annunciation Panel	1	Each
Fire Alarm Bell, 6"	4	Each
Fire Alarm Control Panel	1	Each
Manual Pull Station	4	Each
Smoke Detector	6	Each

Distribution of Repair Costs



Most Costly Repair Tasks

Major Repair Task	Task Cost*	Pct.**
Replace Air Conditioner, Rooftop, 50 Ton	15.22	9.6%
Refinish Sheetrock, Stippled, Interior Wall Finish	13.76	8.7%
Replace Carpet, Nylon 20 oz., High Traffic	13.47	8.5%
Maintain Built-up Roof	13.23	8.3%
Repair Air Conditioner, Rooftop, 50 Ton	9.33	5.9%
Replace Steel, Painted, Door Locks	8.82	5.6%
Fire Sprinkler System, Annual PM	7.64	4.8%
Clean & Reseal Clay Brick, Exterior, 1st Floor	5.88	3.7%
Replace Pipe & Fittings, 2" Copper, Cold Water	5.72	3.6%
Maintain Steel, Painted, Door Locks	5.49	3.5%
Replace Water Heater, Gas/Oil 175 Gph	4.68	2.9%
Replace Pipe & Fittings, 3/4" Copper, Cold Water	4.20	2.6%
Maintain Air Conditioner, Rooftop, 50 Ton	3.97	2.5%
Repoint (50% surface) Clay Brick, Exterior, 1st Floor	3.49	2.2%
Remove & Replace Membrane, Built-up Roof	3.33	2.1%
Place New Membrane Over Existing, Built-up Roof	3.31	2.1%
Replace Drinking Fountain, Refrigerated	2.27	1.4%
Replace Vinyl Tile Flooring	1.97	1.2%
Replace Pipe & Fittings, 3/4" Copper, Hot Water	1.86	1.2%
Clean Water Heater, Gas/Oil 175 Gph	1.72	1.1%
Minor Repair, Acoustic Tile Ceiling	1.60	1.0%
Replace Ballast & Lamps, Fluorescent Lighting Fixture, 160w	1.45	0.9%
Refinish Steel, Painted, Interior Door	1.42	0.9%
Replace Fluorescent Lighting Fixture, 160w	1.27	0.8%
Minor Repair, Sheetrock, Stippled, Interior Wall Finish	.95	0.6%
Replace Incandescent Lighting Fixture, Basic, 100w	.86	0.5%
Annual PM, Distribution Panel Board	.85	0.5%
Non-Destructive Moisture Inspection	.84	0.5%
Replace Pipe Insulation, Cold Water	.77	0.5%
Repair Clay Brick, Exterior, 1st Floor	.77	0.5%

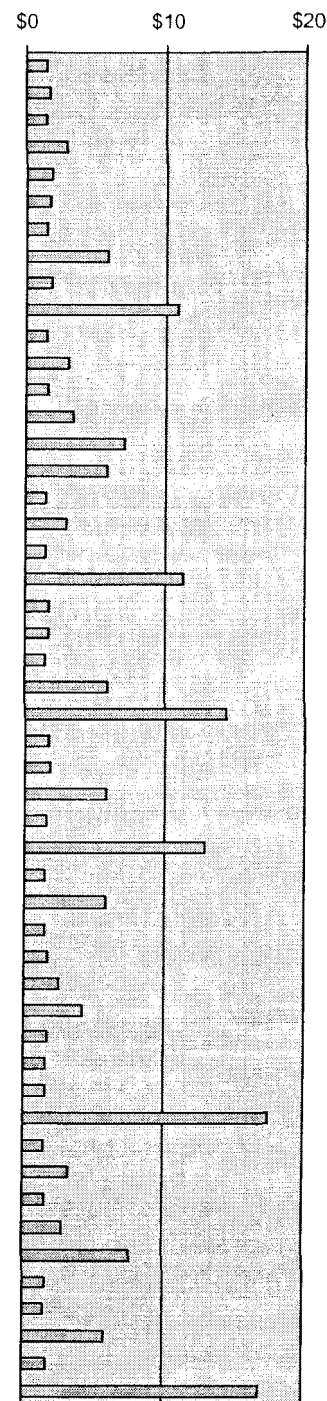
***Use This Profile as a Template.** Adjust for other areas with the local cost index in Chapter 3. Substitute other components using the component data in Chapter 5.

*Task cost (\$2002) per gross square foot over 50 years.

**Percent of total M&R costs.

Cost per Sqft. by System

Building Age	Exterior Closure	Roofing	Interior Construction	Stairways	Interior Finish	Conveying Systems	Plumbing Systems	HVAC Systems	Fire Protection	Electrical Systems	Equipment	Total per Sqft.
1	.02	.53	.30				.19	.16	.16	.10		1.45
2	.02	.53	.30		.01		.39	.16	.16	.10		1.66
3	.02	.58	.30				.19	.16	.16	.10		1.50
4	.02	.53	.41		1.16		.39	.16	.16	.10		2.93
5	.02	.53	.30				.30	.16	.22	.32		1.84
6	.02	.58	.30		.01		.39	.16	.16	.10		1.71
7	.02	.61	.30				.20	.16	.16	.10		1.54
8	.02	.53	.41		3.39		1.08	.16	.16	.11		5.86
9	.02	.58	.30		.34		.19	.16	.16	.10		1.84
10	2.79	.53	2.06		.01		.89	3.27	.42	.91		10.89
11	.02	.53	.30				.19	.16	.16	.10		1.45
12	.09	.58	.41		1.16		.39	.16	.16	.10		3.06
13	.02	.53	.30				.38	.16	.16	.10		1.64
14	.02	2.26	.30		.01		.40	.16	.16	.10		3.41
15	.02	.58	.30				.21	5.09	.22	.69		7.11
16	.02	.53	.41		3.39		1.08	.16	.16	.11		5.86
17	.02	.53	.30				.19	.16	.16	.10		1.45
18	.02	.58	.30		1.32		.39	.16	.16	.10		3.02
19	.02	.53	.30				.19	.16	.16	.10		1.45
20	2.79	.78	2.18		1.90		1.28	.31	.39	1.73		11.37
21	.02	.66	.30				.29	.16	.16	.10		1.68
22	.02	.53	.30		.01		.39	.16	.16	.10		1.66
23	.02	.53	.30				.19	.16	.16	.10		1.45
24	.09	.58	.41		3.39		1.08	.16	.16	.11		5.99
25	2.15	.53	.30				7.28	3.27	.22	.62		14.36
26	.02	.53	.30		.01		.47	.16	.16	.10		1.75
27	.02	.58	.30		.34		.20	.16	.16	.10		1.85
28	.02	3.41	.41		1.16		.39	.16	.16	.10		5.82
29	.02	.53	.30				.28	.16	.16	.10		1.55
30	2.79	.53	2.06		.01		.88	5.09	.42	1.18		12.96
31	.02	.58	.30				.20	.16	.16	.10		1.51
32	.02	.53	.41		3.39		1.07	.16	.16	.10		5.84
33	.02	.53	.30				.20	.16	.16	.11		1.46
34	.02	.58	.30		.01		.37	.16	.16	.10		1.70
35	.02	.61	.30				.84	.16	.22	.32		2.47
36	.09	.53	.41		2.47		.30	.16	.16	.10		4.22
37	.02	.58	.30				.36	.16	.16	.10		1.67
38	.02	.53	.30		.01		.31	.16	.16	.10		1.58
39	.02	.53	.30				.38	.16	.16	.10		1.64
40	2.79	.83	2.18		4.13		1.94	3.42	.39	1.83		17.53
41	.02	.53	.30				.28	.16	.16	.11		1.54
42	.02	2.26	.30		.01		.31	.16	.16	.10		3.32
43	.02	.58	.30				.28	.16	.16	.10		1.59
44	.02	.53	.41		1.16		.30	.16	.16	.10		2.84
45	.02	.53	.30		.34		.51	5.09	.22	.69		7.70
46	.02	.58	.30		.01		.30	.16	.16	.10		1.63
47	.02	.53	.30				.28	.16	.16	.10		1.54
48	.09	.53	.41		3.39		.99	.16	.16	.10		5.84
49	.02	.66	.30				.29	.16	.16	.11		1.68
50	4.92	.53	2.06		.01		7.80	.16	.42	1.00		16.90
Total	19.24	34.33	25.05		32.60		37.63	32.39	9.61	13.45		204.31

50 Year Profile,
Total Cost per Sqft.

A value of "0.00" means a cost of more than \$.000 but less than \$.005 per gross square foot.

3. Local M&R Costs

The statistics in this chapter focus on local maintenance costs for 210 major U.S. and Canadian metropolitan areas. Three types of measures are presented:

- **Local maintenance cost indexes** measure relative maintenance and repair (M&R) costs across metro areas
- **In-house shop rates** for trades and supervisory positions common to the in-house M&R staff
- **Contract labor rates** for trades common in M&R construction

The local maintenance cost index is based on the M&R costs of a two-story office building (shown in Chapter 2) standardized to the Washington DC area. The range of the index is considerable, as indicated in Table 3.1. Costs in New York, NY are an estimated 54% higher than those in Washington DC for the same building. In the other direction, M&R costs in Columbus, GA are an estimated 35% lower than the Washington DC value. This index can be used for simple comparisons among metro areas, and also used to adjust the cost profiles in Chapter 2 for metro areas other than Washington DC (the original area for which the profiles were estimated).

Table 3-1.
Comparison of M&R Costs by Metro Area

Metro Area	Local Maintenance Cost Index*	Metro Area	Local Maintenance Cost Index*	Metro Area	Local Maintenance Cost Index*	Metro Area	Local Maintenance Cost Index*
New York, NY	153.9	Olympia, WA	101.7	Kalamazoo, MI	88.4	Burlington, VT	76.3
Yonkers, NY	139.5	Tacoma, WA	101.7	Bowling Green, KY	88.3	Fargo, ND	76.3
San Francisco, CA	136.6	Buffalo, NY	101.5	Green Bay, WI	88.3	Rutland, VT	76.1
San Jose, CA	130.2	San Diego, CA	101.5	Springfield, MO	87.9	Waco, TX	75.9
Honolulu, HI	126.5	Milwaukee, WI	101.4	Owensboro, KY	87.5	Norfolk, VA	75.6
Oakland, CA	124.9	Akron, OH	101.3	Concord, NH	87.4	Macon, GA	75.4
Newark, NJ	124.4	Charleston, WV	101.2	Manchester, NH	87.4	Wichita Falls, TX	75.2
Jersey City, NJ	124.4	Worcester, MA	100.8	Cedar Rapids, IA	87.3	Bismarck, ND	75.1
Philadelphia, PA	124.2	Medford, OR	100.7	Pueblo, CO	87.3	Tuscaloosa, AL	74.7
Trenton, NJ	123.9	Indianapolis, IN	100.4	Watertown, NY	87.2	Virginia Beach, VA	73.4
Hilo, HI	123.4	Duluth, MN	100.3	Cleveland, OH	86.2	Newport News, VA	73.2
New Brunswick, NJ	122.5	Washington DC	100.0	Omaha, NE	86.1	Orlando, FL	72.8
Camden, NJ	121.6	Ann Arbor, MI	100.0	Houston, TX	85.7	Grand Rapids, MI	72.8
Atlantic City, NJ	121.6	Fall River, MA	99.9	Memphis, TN	85.3	Amarillo, TX	72.7
Boston, MA	119.8	Scranton, PA	99.7	Portland, ME	85.3	Tampa, FL	72.5
Chicago, IL	117.8	Peoria, IL	99.5	Colorado Springs, CO	85.1	Chattanooga, TN	72.3
Stamford, CT	117.4	Columbus, OH	99.0	Phoenix, AZ	85.0	Tulsa, OK	72.2
Wilmington, DE	111.0	Springfield, MA	99.0	Miami, FL	84.4	Hampton, VA	71.9
Kansas City, MO	110.2	Moline, IL	98.4	Boise, ID	83.8	El Paso, TX	71.6
Los Angeles, CA	109.7	Flint, MI	98.1	Salt Lake City, UT	83.6	Savannah, GA	71.5
Minneapolis, MN	108.8	Dayton, OH	97.7	New Orleans, LA	83.5	Corpus Christi, TX	71.5
Lowell, MA	108.1	Terre Haute, IN	97.7	Marquette, MI	83.1	Boulder, CO	71.5
Norwalk, CT	108.1	Springfield, OH	97.4	Wichita, KS	83.0	Biloxi, MS	71.0
Anaheim, CA	108.1	Cincinnati, OH	97.4	Billings, MT	82.6	Sioux Falls, SD	69.8
Danbury, CT	108.0	Youngstown, OH	97.2	Beaumont, TX	82.6	Cheyenne, WY	69.1
Santa Barbara, CA	108.0	Richland, WA	96.9	Pocatello, ID	82.5	Lubbock, TX	67.3
St. Louis, MO	107.3	Baltimore, MD	96.8	Lewiston, ME	82.3	Columbus, GA	65.4
Fairbanks, AK	106.9	Reading, PA	96.7	Albuquerque, NM	82.1	Rapid City, SD	65.1
Detroit, MI	106.9	Rochester, MN	96.2	Sioux City, IA	82.0	Roanoke, VA	64.5
Oxnard, CA	106.7	Harrisburg, PA	96.1	Austin, TX	82.0	Tallahassee, FL	64.1
Pittsburgh, PA	106.5	Madison, WI	96.1	Altus, OK	81.3	Raleigh-Durham, NC	64.0
Stockton, CA	106.3	Kokomo, IN	96.0	Lawton, OK	81.3	Winston-Salem, NC	63.9
Juneau, AK	106.2	Carson City, NV	95.5	Daytona Beach, FL	81.3	Greensboro, NC	62.9
Sacramento, CA	106.0	Reno, NV	95.5	San Antonio, TX	81.1	Charlotte, NC	62.9
Las Vegas, NV	105.8	Rochester, NY	95.4	Tucson, AZ	81.0	Jackson, MS	62.8
Salem, OR	105.1	Lansing, MI	94.7	Oklahoma City, OK	80.5	Columbia, SC	61.8
Anchorage, AK	105.0	Louisville, KY	94.2	Great Falls, MT	80.2	Charleston, SC	61.7
Rockford, IL	104.9	Muncie, IN	94.1	Nashville, TN	80.0	Beaufort, SC	56.2
Toledo, OH	104.8	Saginaw, MI	94.0	Richmond, VA	79.8		
Portland, OR	104.7	Davenport, IA	93.4	Ogden, UT	79.6		
Riverside, CA	104.7	Erie, PA	93.2	Dallas, TX	79.5		
Eugene, OR	104.6	South Bend, IN	92.9	Birmingham, AL	79.5		
Gary, IN	104.5	Evansville, IN	92.5	Fort Smith, TX	79.1		
Seattle, WA	103.9	Battle Creek, MI	92.3	Fort Worth, TX	78.7		
New Haven, CT	103.3	Albany, NY	92.3	Alamogordo, NM	78.7		
Waterbury, CT	103.2	Denver, CO	91.3	Jacksonville, FL	78.6		
Springfield, IL	103.0	Spokane, WA	90.8	Las Cruces, NM	78.4		
Parkersburg, WV	102.9	Syracuse, NY	90.7	Fort Lauderdale, FL	78.3		
Fresno, CA	102.9	Cumberland, MD	90.1	Shreveport, LA	78.1		
Bakersfield, CA	102.7	Topeka, KS	89.9	Mobile, AL	77.5		
Brockton, MA	102.1	Atlanta, GA	89.8	Lexington, KY	77.3		
Providence, RI	102.1	Des Moines, IA	89.8	Huntsville, AL	77.1		
Hartford, CT	102.0	Utica, NY	89.8	Little Rock, AR	77.1		
Norwich, CT	102.0	Eau Claire, WI	89.3	Knoxville, TN	76.3		
						Canadian Cities	
						Toronto, Ontario	103.4
						Hamilton, Ontario	99.1
						London, Ontario	97.0
						Ottawa, Ontario	95.3
						Vancouver, B.C.	95.0
						Quebec, Quebec	86.3
						Montreal, Quebec	85.2
						Calgary, Alberta	79.2
						Edmonton, Alberta	79.1
						Winnipeg, Manitoba	78.9

*Total average cost, Washington DC=100; Canadian cities are in Canadian dollars.

3.1 Local Maintenance Cost Indexes, Selected Metro Areas

Area	Cost per Sqft.	Local Index	200 Area Ranking	Area	Cost per Sqft.	Local Index	200 Area Ranking
Chicago, IL				Cumberland, MD			
PM & Minor Repair.....	\$.46	129.7	15	PM & Minor Repair.....	\$.32	90.5	112
Unscheduled Maintenance.....	.47	133.9	15	Unscheduled Maintenance.....	.31	89.1	111
Renewal & Replacement.....	1.48	110.4	16	Renewal & Replacement.....	1.21	90.3	100
Total Average Cost.....	2.41	117.8	16	Total Average Cost.....	1.84	90.1	103
Cincinnati, OH				Dallas, TX			
PM & Minor Repair.....	.32	90.5	113	PM & Minor Repair.....	.28	77.9	148
Unscheduled Maintenance.....	.31	89.1	112	Unscheduled Maintenance.....	.26	74.5	148
Renewal & Replacement.....	1.36	101.3	48	Renewal & Replacement.....	1.09	81.3	147
Total Average Cost.....	1.99	97.4	78	Total Average Cost.....	1.63	79.5	149
Cleveland, OH				Danbury, CT			
PM & Minor Repair.....	.33	94.4	98	PM & Minor Repair.....	.38	107.9	45
Unscheduled Maintenance.....	.33	93.4	97	Unscheduled Maintenance.....	.38	109.1	45
Renewal & Replacement.....	1.10	82.1	141	Renewal & Replacement.....	1.45	107.8	21
Total Average Cost.....	1.76	86.2	119	Total Average Cost.....	2.21	108.0	25
Colorado Springs, CO				Davenport, IA			
PM & Minor Repair.....	.32	91.5	110	PM & Minor Repair.....	.34	97.3	89
Unscheduled Maintenance.....	.31	90.1	110	Unscheduled Maintenance.....	.34	96.7	89
Renewal & Replacement.....	1.10	82.1	142	Renewal & Replacement.....	1.23	91.5	95
Total Average Cost.....	1.74	85.1	124	Total Average Cost.....	1.91	93.4	94
Columbia, SC				Dayton, OH			
PM & Minor Repair.....	.17	49.2	198	PM & Minor Repair.....	.33	93.5	103
Unscheduled Maintenance.....	.14	41.5	198	Unscheduled Maintenance.....	.32	92.4	103
Renewal & Replacement.....	.94	70.4	195	Renewal & Replacement.....	1.34	100.1	55
Total Average Cost.....	1.26	61.8	198	Total Average Cost.....	2.00	97.7	75
Columbus, GA				Daytona Beach, FL			
PM & Minor Repair.....	.19	52.6	191	PM & Minor Repair.....	.24	68.9	177
Unscheduled Maintenance.....	.16	45.3	191	Unscheduled Maintenance.....	.22	64.2	177
Renewal & Replacement.....	.99	74.1	182	Renewal & Replacement.....	1.19	89.1	105
Total Average Cost.....	1.34	65.4	189	Total Average Cost.....	1.66	81.3	141
Columbus, OH				Denver, CO			
PM & Minor Repair.....	.32	91.6	108	PM & Minor Repair.....	.35	98.3	85
Unscheduled Maintenance.....	.32	90.3	108	Unscheduled Maintenance.....	.34	97.8	85
Renewal & Replacement.....	1.38	103.2	34	Renewal & Replacement.....	1.18	87.8	114
Total Average Cost.....	2.02	99.0	71	Total Average Cost.....	1.87	91.3	100
Concord, NH				Des Moines, IA			
PM & Minor Repair.....	.30	86.0	126	PM & Minor Repair.....	.33	93.7	102
Unscheduled Maintenance.....	.29	83.6	127	Unscheduled Maintenance.....	.32	92.6	102
Renewal & Replacement.....	1.19	88.8	107	Renewal & Replacement.....	1.18	88.0	113
Total Average Cost.....	1.79	87.4	114	Total Average Cost.....	1.83	89.8	106
Corpus Christi, TX				Detroit, MI			
PM & Minor Repair.....	.22	63.1	184	PM & Minor Repair.....	.41	116.2	26
Unscheduled Maintenance.....	.20	57.6	184	Unscheduled Maintenance.....	.41	118.1	26
Renewal & Replacement.....	1.04	77.4	169	Renewal & Replacement.....	1.36	101.5	46
Total Average Cost.....	1.46	71.5	183	Total Average Cost.....	2.18	106.9	29

Note: Costs per Sqft. are the annual average costs, over a 50 year service life, of maintaining the two-story office building shown in Chapter 2. Local Indexes are standardized (equal 100) for the Washington DC area.



Fermilab

FESS/Engineering

Please ensure that your review included a review of the project for appropriateness of the proposed systems, impacts on existing systems and operations and specific technical requirements to be incorporated into the design

PLEASE ENTER THE FOLLOWING INFORMATION

Reviewer:

Bill Shull

Project Number

6-8-3

UIP ECP (If applicable)

Project Phase:

Comment and Compliance

Comment Date:

February 12, 2004

Print



Duplicate



Main
Menu



COMMENT

Drawing Reference:

START WITH PAGE NUMBER FIRST FOLLOWED BY SECTION OR
DETAIL REFERENCE. Example: A-1, Detail 4

Specification Reference:

PROVIDE SPECIFICATION SECTION AND PARAGRAPH IF APPLICABLE.
Example: 02070 1.5.D.2 (Page 02070-2)

Comment:

No comments

RESPONSE

Project Contact Response:

Thank You for Reviewing this Project

Comment:



Fermilab

FESS/Engineering

Please ensure that your review included a review of the project for appropriateness of the proposed systems, impacts on existing systems and operations and specific technical requirements to be incorporated into the design

PLEASE ENTER THE FOLLOWING INFORMATION

Reviewer:

Bob Mau

Project Number

6-8-3

UIP ECP (If applicable)

Project Phase:

Comment and Compliance

Comment Date:

February 16, 2004

Print



Duplicate



Main
Menu



COMMENT

Drawing Reference:

START WITH PAGE NUMBER FIRST FOLLOWED BY SECTION OR
DETAIL REFERENCE. Example: A-1, Detail 4

Specification Reference:

PROVIDE SPECIFICATION SECTION AND PARAGRAPH IF APPLICABLE.
Example: 02070 1.5.D.2 (Page 02070-2)

Comment:

There is a new 13.8 cable to be installed that looks like it will cut through the Berm(impacts radiation shielding). This must clearly be carefully coordinated.

where is the dividing line between PPD and AD at this building

RESPONSE

Project Contact Response:

Agree and will incorporate comments

Comment:

These discussions are on-going.



Fermilab

FESS/Engineering

Please ensure that your review included a review of the project for appropriateness of the proposed systems, impacts on existing systems and operations and specific technical requirements to be incorporated into the design

PLEASE ENTER THE FOLLOWING INFORMATION

Reviewer:

C. Worby

Project Number

6-8-3

UIP ECP (If applicable)

Project Phase:

Comment and Compliance

Comment Date:

February 10, 2004

Print



Duplicate



Main
Menu



COMMENT

Drawing Reference:

START WITH PAGE NUMBER FIRST FOLLOWED BY SECTION OR
DETAIL REFERENCE. Example: A-1, Detail 4

Specification Reference:

PROVIDE SPECIFICATION SECTION AND PARAGRAPH IF APPLICABLE.
Example: 02070 1.5.D.2 (Page 02070-2)

Comment:

No comments

RESPONSE

Project Contact Response:

Thank You for Reviewing this Project

Comment:



Fermilab

FESS/Engineering

Please ensure that your review included a review of the project for appropriateness of the proposed systems, impacts on existing systems and operations and specific technical requirements to be incorporated into the design

PLEASE ENTER THE FOLLOWING INFORMATION

Reviewer:

David Baird

Project Number

6-8-3

UIP ECP (If applicable)

Project Phase:

Comment and Compliance

Comment Date:

February 6, 2004

Print



Duplicate



Main
Menu



COMMENT

Drawing Reference:

START WITH PAGE NUMBER FIRST FOLLOWED BY SECTION OR
DETAIL REFERENCE. Example: A-1, Detail 4

Specification Reference:

PROVIDE SPECIFICATION SECTION AND PARAGRAPH IF APPLICABLE.
Example: 02070 1.5.D.2 (Page 02070-2)

Comment:

I have no comments regarding this review at this time. - Dave.

RESPONSE

Project Contact Response:

Thank You for Reviewing this Project

Comment:



Fermilab

FESS/Engineering

Please ensure that your review included a review of the project for appropriateness of the proposed systems, impacts on existing systems and operations and specific technical requirements to be incorporated into the design

PLEASE ENTER THE FOLLOWING INFORMATION

Reviewer:

Ed Temple

Project Number

6-8-3

UIP ECP (If applicable)

Project Phase:

Comment and Compliance

Comment Date:

February 16, 2004

Print



Duplicate



Main
Menu



COMMENT

Drawing Reference:

START WITH PAGE NUMBER FIRST FOLLOWED BY SECTION OR
DETAIL REFERENCE. Example: A-1, Detail 4

Specification Reference:

PROVIDE SPECIFICATION SECTION AND PARAGRAPH IF APPLICABLE.
Example: 02070 1.5.D.2 (Page 02070-2)

Comment:

I have only three comments both of an editorial nature:

- 1) On page 8 under Electrical I believe "quite power" should be "quiet power."
- 2) about 10 drawings are in the document twice.
- 3) other typographical and grammatical errors might be reduced by an editor.

RESPONSE

Project Contact Response:

Agree and will incorporate comments

Comment:



Fermilab

FESS/Engineering

Please ensure that your review included a review of the project for appropriateness of the proposed systems, impacts on existing systems and operations and specific technical requirements to be incorporated into the design

PLEASE ENTER THE FOLLOWING INFORMATION

Reviewer:

Jim Elliott

Project Number

6-8-3

UIP ECP (If applicable)

Project Phase:

Comment and Compliance

Comment Date:

February 6, 2004

Print



Duplicate



Main
Menu



COMMENT

Drawing Reference:

START WITH PAGE NUMBER FIRST FOLLOWED BY SECTION OR
DETAIL REFERENCE. Example: A-1, Detail 4

Specification Reference:

PROVIDE SPECIFICATION SECTION AND PARAGRAPH IF APPLICABLE.
Example: 02070 1.5.D.2 (Page 02070-2)

Comment:

No comments

RESPONSE

Project Contact Response:

Thank You for Reviewing this Project

Comment:



Fermilab

FESS/Engineering

Please ensure that your review included a review of the project for appropriateness of the proposed systems, impacts on existing systems and operations and specific technical requirements to be incorporated into the design

PLEASE ENTER THE FOLLOWING INFORMATION

Reviewer:

Joe Howell

Project Number

6-8-3

UIP ECP (If applicable)

Project Phase:

Comment Date:

February 19, 2004

Print



Duplicate



Main
Menu



COMMENT

Drawing Reference:

START WITH PAGE NUMBER FIRST FOLLOWED BY SECTION OR
DETAIL REFERENCE. Example: A-1, Detail 4

Specification Reference:

PROVIDE SPECIFICATION SECTION AND PARAGRAPH IF APPLICABLE.
Example: 02070 1.5.D.2 (Page 02070-2)

Comment:

Need to add user cable penetrations between computer floor.

RESPONSE

Project Contact Response:

Agree and will incorporate comments

Comment:



Fermilab

FESS/Engineering

Please ensure that your review included a review of the project for appropriateness of the proposed systems, impacts on existing systems and operations and specific technical requirements to be incorporated into the design

PLEASE ENTER THE FOLLOWING INFORMATION

Reviewer:

John Anderson John Foglesong

Project Number

6-8-3

UIP ECP (If applicable)

Project Phase:

Comment and Compliance

Comment Date:

February 16, 2004

Print



Duplicate



Main
Menu



COMMENT

Drawing Reference:

START WITH PAGE NUMBER FIRST FOLLOWED BY SECTION OR
DETAIL REFERENCE. Example: A-1, Detail 4

Specification Reference:

PROVIDE SPECIFICATION SECTION AND PARAGRAPH IF APPLICABLE.
Example: 02070 1.5.D.2 (Page 02070-2)

Comment:

The 150KVA transformer for the collision hall experiment electronics from SWBD-C0-1 is not listed as a type K-4 as are all the other transformers. Shouldn't it be the same type?

RESPONSE

Project Contact Response:

Agree and will incorporate comments

Comment:

The 1500kva transformer that will be specified is the Fermilab standard pulse power pad mounted transformers. All 1500 KVA transformers will use the same specifications.



Fermilab

FESS/Engineering

Please ensure that your review included a review of the project for appropriateness of the proposed systems, impacts on existing systems and operations and specific technical requirements to be incorporated into the design

PLEASE ENTER THE FOLLOWING INFORMATION

Reviewer:

John Anderson John Foglesong

Project Number

6-8-3

UIP ECP (If applicable)

Project Phase:

Comment and Compliance

Comment Date:

February 16, 2004

Print



Duplicate



Main
Menu



COMMENT

Drawing Reference:

START WITH PAGE NUMBER FIRST FOLLOWED BY SECTION OR
DETAIL REFERENCE. Example: A-1, Detail 4

Specification Reference:

PROVIDE SPECIFICATION SECTION AND PARAGRAPH IF APPLICABLE.
Example: 02070 1.5.D.2 (Page 02070-2)

Comment:

The one-line drawing shows two 75 KVA transformers that service the 1st floor counting room. If we look at page M-2 of drawing 6-8-3, we find 58 relay rack positions and a total power draw estimate of 132 kW. Division gives about 2kW per rack position; many relay racks already determined in the experiment have power draws in excess of this number. Further, the 132kW expected load is dangerously close to the 150kW of total AC available from the two transformers. We should probably allow for larger transformers - or a third 75KVA unit.

RESPONSE

Project Contact Response:

Disagree for Reasons Noted Below

Comment:

The space available as the drawing shows only allow for roughly 45 racks. We will verify that the supplied power is adequate for the rack electrical loads.



Fermilab

FESS/Engineering

Please ensure that your review included a review of the project for appropriateness of the proposed systems, impacts on existing systems and operations and specific technical requirements to be incorporated into the design

PLEASE ENTER THE FOLLOWING INFORMATION

Reviewer:

John Anderson John Foglesong

Project Number

6-8-3

UIP ECP (If applicable)

Project Phase:

Comment and Compliance

Comment Date:

February 16, 2004

Print



Duplicate



Main
Menu



COMMENT

Drawing Reference:

START WITH PAGE NUMBER FIRST FOLLOWED BY SECTION OR
DETAIL REFERENCE. Example: A-1, Detail 4

Specification Reference:

PROVIDE SPECIFICATION SECTION AND PARAGRAPH IF APPLICABLE.
Example: 02070 1.5.D.2 (Page 02070-2)

Comment:

We also want to clarify the intended usage of PP-C0-1-11, -12, -13 and -14. These are intended to be simple panels with a minimum number of breakers mounted to the wall in the collision hall area and are not the final panelboards to distribute power to each relay rack. The panelboards with individual breakers for each circuit will have to be mounted to the relay racks at a later time when the equipment is actually installed. The feed from, for example, PP-C0-1-11 to the associated panelboard on the racks will be a conduit of one large circuit with broken ground. The ground is broken because PP-C0-1-11 will obviously be tied directly to the building but the panelboard on the relay racks will be inductively isolated from the building ground. We foresee the panelboards on the rack groups to be installed much later using T&M contracts

RESPONSE

Project Contact Response:

Agree and will incorporate comments

Comment:



Fermilab

FESS/Engineering

Please ensure that your review included a review of the project for appropriateness of the proposed systems, impacts on existing systems and operations and specific technical requirements to be incorporated into the design

PLEASE ENTER THE FOLLOWING INFORMATION

Reviewer:

John Anderson John Foglesong

Project Number

6-8-3

UIP ECP (If applicable)

Project Phase:

Comment and Compliance

Comment Date:

February 16, 2004

Print



Duplicate



Main
Menu



COMMENT

Drawing Reference:

START WITH PAGE NUMBER FIRST FOLLOWED BY SECTION OR
DETAIL REFERENCE. Example: A-1, Detail 4

Specification Reference:

PROVIDE SPECIFICATION SECTION AND PARAGRAPH IF APPLICABLE.
Example: 02070 1.5.D.2 (Page 02070-2)

Comment:

With regard to section 2.1.3.2, the four panels PP-C0-1-11 thru PP-C0-1-14 are the four referenced in this section and the section is being updated to match. We picture the panel in the collision hall for 'non detector electronics' to be PHP-C0-3-6-1, and that this panel controls lights but has only the minimum number of convenience outlets necessary for powering tools during the installation of lights and the relay racks. Our concern is outlets that might be used by experimenters after installation is complete that would violate the detector grounding scheme. We plan on providing convenience outlets throughout the rack areas so only the minimal number of outlets from PHP-C0-3-6-1 should be installed. Panel PHP-C0-3-5 in the assembly hall should have a few 208VAC 3-phase circuits relegated to use by electronics commissioning, but again, this is seen as a relatively small load

RESPONSE

Project Contact Response:

Agree and will incorporate comments

Comment:



Fermilab

FESS/Engineering

Please ensure that your review included a review of the project for appropriateness of the proposed systems, impacts on existing systems and operations and specific technical requirements to be incorporated into the design

PLEASE ENTER THE FOLLOWING INFORMATION

Reviewer:

Michael Gerardi

Project Number

6-8-3

UIP ECP (If applicable)

Project Phase:

Comment and Compliance

Comment Date:

February 16, 2004

Print



Duplicate



Main
Menu



COMMENT

Drawing Reference:

START WITH PAGE NUMBER FIRST FOLLOWED BY SECTION OR
DETAIL REFERENCE. Example: A-1, Detail 4

Specification Reference:

PROVIDE SPECIFICATION SECTION AND PARAGRAPH IF APPLICABLE.
Example: 02070 1.5.D.2 (Page 02070-2)

Comment:

During operational periods excavation that has the potential of compromising the Tevatron shielding cannot be allowed without further discussion and approval. As you might expect it has far reaching implications. This includes the feeders, concrete encased duct bank, transformer pads, heating and air conditioning ducts, and the new southeast stairwell.

RESPONSE

Project Contact Response:

Agree and will incorporate comments

Comment:



Fermilab

FESS/Engineering

Please ensure that your review included a review of the project for appropriateness of the proposed systems, impacts on existing systems and operations and specific technical requirements to be incorporated into the design

PLEASE ENTER THE FOLLOWING INFORMATION

Reviewer:

Michael Gerardi

Project Number

6-8-3

UIP ECP (If applicable)

Project Phase:

Comment and Compliance

Comment Date:

February 16, 2004

Print



Duplicate



Main
Menu



COMMENT

Drawing Reference:

START WITH PAGE NUMBER FIRST FOLLOWED BY SECTION OR
DETAIL REFERENCE. Example: A-1, Detail 4

Specification Reference:

PROVIDE SPECIFICATION SECTION AND PARAGRAPH IF APPLICABLE.
Example: 02070 1.5.D.2 (Page 02070-2)

Comment:

Have the design modifications been reviewed in general wrt rad safety
and prompt radiation ?

Have the design modifications been reviewed wrt operational impact to
the Tev ?

RESPONSE

Project Contact Response:

Thank You for Reviewing this Project

Comment:

The "C-0 Test Area" project was reviewed in 1998. During Title 2 any modifications will need further review.



Fermilab

FESS/Engineering

Please ensure that your review included a review of the project for appropriateness of the proposed systems, impacts on existing systems and operations and specific technical requirements to be incorporated into the design

PLEASE ENTER THE FOLLOWING INFORMATION

Reviewer:

Michael Gerardi

Project Number

6-8-3

UIP ECP (If applicable)

Project Phase:

Comment and Compliance

Comment Date:

February 16, 2004

Print



Duplicate



Main
Menu



COMMENT

Drawing Reference:

START WITH PAGE NUMBER FIRST FOLLOWED BY SECTION OR
DETAIL REFERENCE. Example: A-1, Detail 4

Specification Reference:

PROVIDE SPECIFICATION SECTION AND PARAGRAPH IF APPLICABLE.
Example: 02070 1.5.D.2 (Page 02070-2)

Comment:

Rad Training requirements should be defined and explicit in the text.

RESPONSE

Project Contact Response:

Disagree for Reasons Noted Below

Comment:

The Rad training requirements are important and needs consideration but are better addressed in Title 2. Current understanding of what will be required should not affect cost or schedule if considered during Title 2.



Fermilab

FESS/Engineering

Please ensure that your review included a review of the project for appropriateness of the proposed systems, impacts on existing systems and operations and specific technical requirements to be incorporated into the design

PLEASE ENTER THE FOLLOWING INFORMATION

Reviewer:

Michael Gerardi

Project Number

6-8-3

UIP ECP (If applicable)

Project Phase:

Comment and Compliance

Comment Date:

February 16, 2004

Print



Duplicate



Main
Menu



COMMENT

Drawing Reference:

START WITH PAGE NUMBER FIRST FOLLOWED BY SECTION OR
DETAIL REFERENCE. Example: A-1, Detail 4

Specification Reference:

PROVIDE SPECIFICATION SECTION AND PARAGRAPH IF APPLICABLE.
Example: 02070 1.5.D.2 (Page 02070-2)

Comment:

The duct connection to the collision hall should be reviewed for
design adequacy to insure compliance with FRCM guidance.

RESPONSE

Project Contact Response:

Agree and will incorporate comments

Comment:



Fermilab

FESS/Engineering

Please ensure that your review included a review of the project for appropriateness of the proposed systems, impacts on existing systems and operations and specific technical requirements to be incorporated into the design

PLEASE ENTER THE FOLLOWING INFORMATION

Reviewer:

Michael Gerardi

Project Number

6-8-3

UIP ECP (If applicable)

Project Phase:

Comment and Compliance

Comment Date:

February 16, 2004

Print



Duplicate



Main
Menu



COMMENT

Drawing Reference:

START WITH PAGE NUMBER FIRST FOLLOWED BY SECTION OR
DETAIL REFERENCE. Example: A-1, Detail 4

Specification Reference:

PROVIDE SPECIFICATION SECTION AND PARAGRAPH IF APPLICABLE.
Example: 02070 1.5.D.2 (Page 02070-2)

Comment:

The [northwest] stairwell should be reviewed for design adequacy to insure compliance with FRCM guidance.

RESPONSE

Project Contact Response:

Agree and will incorporate comments

Comment:

The stair is within 50' of the berm and therefore will require a shielding assessment drawing prior to construction. A mention that this work is required will be incorporated.



Fermilab

FESS/Engineering

Please ensure that your review included a review of the project for appropriateness of the proposed systems, impacts on existing systems and operations and specific technical requirements to be incorporated into the design

PLEASE ENTER THE FOLLOWING INFORMATION

Reviewer:

Michael Gerardi

Project Number

6-8-3

UIP ECP (If applicable)

Project Phase:

Comment and Compliance

Comment Date:

February 16, 2004

Print



Duplicate



Main
Menu



COMMENT

Drawing Reference:

START WITH PAGE NUMBER FIRST FOLLOWED BY SECTION OR
DETAIL REFERENCE. Example: A-1, Detail 4

Specification Reference:

PROVIDE SPECIFICATION SECTION AND PARAGRAPH IF APPLICABLE.
Example: 02070 1.5.D.2 (Page 02070-2)

Comment:

The TeV berm is assessed as a minimally occupied area during operation and a section of that berm is actually posted. The possibility of any extended occupancy will need to be re-evaluated and approved prior to any activity.

RESPONSE

Project Contact Response:

Disagree for Reasons Noted Below

Comment:

A shielding analysis was accomplished during the 1998 design phase. No change in occupancy is anticipated.



Fermilab

FESS/Engineering

Please ensure that your review included a review of the project for appropriateness of the proposed systems, impacts on existing systems and operations and specific technical requirements to be incorporated into the design

PLEASE ENTER THE FOLLOWING INFORMATION

Reviewer:

Mike Church

Project Number

6-8-3

UIP ECP (If applicable)

Project Phase:

Comment and Compliance

Comment Date:

March 9, 2004

Print



Duplicate



Main
Menu



COMMENT

Drawing Reference:

START WITH PAGE NUMBER FIRST FOLLOWED BY SECTION OR
DETAIL REFERENCE. Example: A-1, Detail 4

Specification Reference:

PROVIDE SPECIFICATION SECTION AND PARAGRAPH IF APPLICABLE.
Example: 02070 1.5.D.2 (Page 02070-2)

Comment:

Gantt chart: has wrong dates for '05 and '06 shutdowns. Official dates in BTeV milestones are 8/8/05 - 9/30/05, 8/7/06 - 9/29/06. But will probably change anyway.

RESPONSE

Project Contact Response:

Agree and will incorporate comments

Comment:



Fermilab

FESS/Engineering

Please ensure that your review included a review of the project for appropriateness of the proposed systems, impacts on existing systems and operations and specific technical requirements to be incorporated into the design

PLEASE ENTER THE FOLLOWING INFORMATION

Reviewer:

Mike Church

Project Number

6-8-3

UIP ECP (If applicable)

Project Phase:

Comment and Compliance

Comment Date:

March 9, 2004

Print



Duplicate



Main
Menu



COMMENT

Drawing Reference:

START WITH PAGE NUMBER FIRST FOLLOWED BY SECTION OR
DETAIL REFERENCE. Example: A-1, Detail 4

Specification Reference:

PROVIDE SPECIFICATION SECTION AND PARAGRAPH IF APPLICABLE.
Example: 02070 1.5.D.2 (Page 02070-2)

Comment:

In several places you refer to "Test Hall". Do you mean "Collision Hall"? If so, it might be a good idea to change it for uniformity. (The C0 IR Design Report uses "Collision Hall".)

RESPONSE

Project Contact Response:

Agree and will incorporate comments

Comment:

"Collision Hall" will be used.



Fermilab

FESS/Engineering

Please ensure that your review included a review of the project for appropriateness of the proposed systems, impacts on existing systems and operations and specific technical requirements to be incorporated into the design

PLEASE ENTER THE FOLLOWING INFORMATION

Reviewer:

Mike Church

Project Number

6-8-3

UIP ECP (If applicable)

Project Phase:

Comment and Compliance

Comment Date:

March 9, 2004

Print



Duplicate



Main
Menu



COMMENT

Drawing Reference:

START WITH PAGE NUMBER FIRST FOLLOWED BY SECTION OR
DETAIL REFERENCE. Example: A-1, Detail 4

Specification Reference:

PROVIDE SPECIFICATION SECTION AND PARAGRAPH IF APPLICABLE.
Example: 02070 1.5.D.2 (Page 02070-2)

Comment:

pg 6: You say "all" LCW piping will be under the C0 IR project. Not quite. We take the headers into the Collision Hall and Assembly Hall, but manifolding and distribution will be taken care of by some other part of the BTeV project.

RESPONSE

Project Contact Response:

Agree and will incorporate comments

Comment:

It is my current understanding that all LCW will either be installed under the IR or under 1.10. I will correct my document in a way not to interject an agreement or boundaries between WBS 2.0 and 1.10.



Fermilab

FESS/Engineering

Please ensure that your review included a review of the project for appropriateness of the proposed systems, impacts on existing systems and operations and specific technical requirements to be incorporated into the design

PLEASE ENTER THE FOLLOWING INFORMATION

Reviewer:

Mike Church

Project Number

6-8-3

UIP ECP (If applicable)

Project Phase:

Comment and Compliance

Comment Date:

March 9, 2004

Print



Duplicate



Main
Menu



COMMENT

Drawing Reference:

START WITH PAGE NUMBER FIRST FOLLOWED BY SECTION OR
DETAIL REFERENCE. Example: A-1, Detail 4

Specification Reference:

PROVIDE SPECIFICATION SECTION AND PARAGRAPH IF APPLICABLE.
Example: 02070 1.5.D.2 (Page 02070-2)

Comment:

pg. 6: You say that 97% of the magnet loads is 647KW. John Riordan's latest number is 599KW = 100%. I suggest you discuss with him and come to an agreement.

RESPONSE

Project Contact Response:

Response Incomplete, Additional Information to Follow

Comment:

We are removing mention of this load from the WBS 3.0 documents and should be coordinated between WBS 1.10 and WBS 2.0.



Fermilab

FESS/Engineering

Please ensure that your review included a review of the project for appropriateness of the proposed systems, impacts on existing systems and operations and specific technical requirements to be incorporated into the design

PLEASE ENTER THE FOLLOWING INFORMATION

Reviewer:

Mike Church

Project Number

6-8-3

UIP ECP (If applicable)

Project Phase:

Comment and Compliance

Comment Date:

March 9, 2004

Print



Duplicate



Main
Menu



COMMENT

Drawing Reference:

START WITH PAGE NUMBER FIRST FOLLOWED BY SECTION OR
DETAIL REFERENCE. Example: A-1, Detail 4

Specification Reference:

PROVIDE SPECIFICATION SECTION AND PARAGRAPH IF APPLICABLE.
Example: 02070 1.5.D.2 (Page 02070-2)

Comment:

pg 8: Our power requirements at B4 and C1 have changed. I will set up a meeting next week with you George and others to discuss this issue and some other issues.

RESPONSE

Project Contact Response:

Agree and will incorporate comments

Comment:

Weekly meeting have started AND THIS CHANGE HAS BEEN DISCUSSED AND OUR
DOCUMENTS REVISED.



Fermilab

FESS/Engineering

Please ensure that your review included a review of the project for appropriateness of the proposed systems, impacts on existing systems and operations and specific technical requirements to be incorporated into the design

PLEASE ENTER THE FOLLOWING INFORMATION

Reviewer:

Mike Church

Project Number

6-8-3

UIP ECP (If applicable)

Project Phase:

Comment and Compliance

Comment Date:

March 9, 2004

Print



Duplicate



Main
Menu



COMMENT

Drawing Reference:

START WITH PAGE NUMBER FIRST FOLLOWED BY SECTION OR
DETAIL REFERENCE. Example: A-1, Detail 4

Specification Reference:

PROVIDE SPECIFICATION SECTION AND PARAGRAPH IF APPLICABLE.
Example: 02070 1.5.D.2 (Page 02070-2)

Comment:

pg 8: You say that feeder 45 will be routed from C4. Do you really mean B4? I assume that this feeder will be routed through the berm via the same carrier pipe that will eventually contain the new feeder 59?

RESPONSE

Project Contact Response:

Agree and will incorporate comments

Comment:



Fermilab

FESS/Engineering

Please ensure that your review included a review of the project for appropriateness of the proposed systems, impacts on existing systems and operations and specific technical requirements to be incorporated into the design

PLEASE ENTER THE FOLLOWING INFORMATION

Reviewer:

Mike Church

Project Number

6-8-3

UIP ECP (If applicable)

Project Phase:

Comment and Compliance

Comment Date:

March 9, 2004

Print



Duplicate



Main
Menu



COMMENT

Drawing Reference:

START WITH PAGE NUMBER FIRST FOLLOWED BY SECTION OR
DETAIL REFERENCE. Example: A-1, Detail 4

Specification Reference:

PROVIDE SPECIFICATION SECTION AND PARAGRAPH IF APPLICABLE.
Example: 02070 1.5.D.2 (Page 02070-2)

Comment:

The 2 items that will require review/inspection by the Tevatron group for compliance with radiation shielding are 1) carrier pipe carrying the feeders across the berm, and 2) concrete piers in the berm supporting the housing for the new buswork. Both very minor issues.

RESPONSE

Project Contact Response:

Agree and will incorporate comments

Comment:

Comments will be incorporated during final design.



Fermilab

FESS/Engineering

Please ensure that your review included a review of the project for appropriateness of the proposed systems, impacts on existing systems and operations and specific technical requirements to be incorporated into the design

PLEASE ENTER THE FOLLOWING INFORMATION

Reviewer:

Mike Church

Project Number

6-8-3

UIP ECP (If applicable)

Project Phase:

Comment and Compliance

Comment Date:

March 9, 2004

Print



Duplicate



Main
Menu



COMMENT

Drawing Reference:

START WITH PAGE NUMBER FIRST FOLLOWED BY SECTION OR
DETAIL REFERENCE. Example: A-1, Detail 4

Specification Reference:

PROVIDE SPECIFICATION SECTION AND PARAGRAPH IF APPLICABLE.
Example: 02070 1.5.D.2 (Page 02070-2)

Comment:

Your C0 service building layout needs to be changed. Again, I will arrange a meeting with relevant parties next week to discuss the issues.

RESPONSE

Project Contact Response:

Agree and will incorporate comments

Comment:

The updated design is included in this review.



Fermilab

FESS/Engineering

Please ensure that your review included a review of the project for appropriateness of the proposed systems, impacts on existing systems and operations and specific technical requirements to be incorporated into the design

PLEASE ENTER THE FOLLOWING INFORMATION

Reviewer:

Peter Garbincius

Project Number

6-8-3

UIP ECP (If applicable)

Project Phase:

Comment and Compliance

Comment Date:

February 16, 2004

Print



Duplicate



Main
Menu



COMMENT

Drawing Reference:

START WITH PAGE NUMBER FIRST FOLLOWED BY SECTION OR
DETAIL REFERENCE. Example: A-1, Detail 4

Specification Reference:

PROVIDE SPECIFICATION SECTION AND PARAGRAPH IF APPLICABLE.
Example: 02070 1.5.D.2 (Page 02070-2)

Comment:

Also John Riordan has to understand how to install, maintain, service, remove above ground water cooled bus in the 3'x3' duct. There should be discussion on ODH and Radiation safety for contractors, specifically when entering C0 Experimental Hall without isolation from Tevatron tunnel, for work shown on drawings M-6 and E-6.

RESPONSE

Project Contact Response:

Agree and will incorporate comments

Comment:



Fermilab

FESS/Engineering

Please ensure that your review included a review of the project for appropriateness of the proposed systems, impacts on existing systems and operations and specific technical requirements to be incorporated into the design

PLEASE ENTER THE FOLLOWING INFORMATION

Reviewer:

Peter Garbincius

Project Number

6-8-3

UIP ECP (If applicable)

Project Phase:

Comment and Compliance

Comment Date:

February 16, 2004

Print



Duplicate



Main
Menu



COMMENT

Drawing Reference:

START WITH PAGE NUMBER FIRST FOLLOWED BY SECTION OR
DETAIL REFERENCE. Example: A-1, Detail 4

Specification Reference:

PROVIDE SPECIFICATION SECTION AND PARAGRAPH IF APPLICABLE.
Example: 02070 1.5.D.2 (Page 02070-2)

Comment:

p6 - where is the hand-off of MR LCW from AD to PPD/BTeV?

RESPONSE

Project Contact Response:

Agree and will incorporate comments

Comment:

This issue will need to be addressed by the project , PPD and Accellerator division management for both during construction and operations.



Fermilab

FESS/Engineering

Please ensure that your review included a review of the project for appropriateness of the proposed systems, impacts on existing systems and operations and specific technical requirements to be incorporated into the design

PLEASE ENTER THE FOLLOWING INFORMATION

Reviewer:

Peter Garbincius

Project Number

6-8-3

UIP ECP (If applicable)

Project Phase:

Comment and Compliance

Comment Date:

February 16, 2004

Print



Duplicate



Main
Menu



COMMENT

Drawing Reference:

START WITH PAGE NUMBER FIRST FOLLOWED BY SECTION OR
DETAIL REFERENCE. Example: A-1, Detail 4

Specification Reference:

PROVIDE SPECIFICATION SECTION AND PARAGRAPH IF APPLICABLE.
Example: 02070 1.5.D.2 (Page 02070-2)

Comment:

**There has to be some discussion of interfacing the M-6 - E-6 work
with the other shutdown work in the C0 Experimental Hall,
specifically when, how long, and limitations on access.**

**Need to determine when is the C0 Experimental Hall turned over from
AD to PPD/BTeV.**

RESPONSE

Project Contact Response:

Agree and will incorporate comments

Comment:

These discussions are on-going.



Fermilab

FESS/Engineering

Please ensure that your review included a review of the project for appropriateness of the proposed systems, impacts on existing systems and operations and specific technical requirements to be incorporated into the design

PLEASE ENTER THE FOLLOWING INFORMATION

Reviewer:

Peter Garbincius

Project Number

6-8-3

UIP ECP (If applicable)

Project Phase:

Comment and Compliance

Comment Date:

February 16, 2004

Print



Duplicate



Main
Menu



COMMENT

Drawing Reference:

A-12

START WITH PAGE NUMBER FIRST FOLLOWED BY SECTION OR
DETAIL REFERENCE. Example: A-1, Detail 4

Specification Reference:

PROVIDE SPECIFICATION SECTION AND PARAGRAPH IF APPLICABLE.
Example: 02070 1.5.D.2 (Page 02070-2)

Comment:

drawing A-12 - Need to show power supplies, reversing switches, and accessories for electrostatic separators in C0 Service Building. I asked George Krafczyk to provide this information.

RESPONSE

Project Contact Response:

Agree and will incorporate comments

Comment:

This information has been provided and is represented on the current drawings.



Fermilab

FESS/Engineering

Please ensure that your review included a review of the project for appropriateness of the proposed systems, impacts on existing systems and operations and specific technical requirements to be incorporated into the design

PLEASE ENTER THE FOLLOWING INFORMATION

Reviewer:

Steve Krstulovich

Project Number

6-8-3

UIP ECP (If applicable)

Project Phase:

Comment and Compliance

Comment Date:

February 12, 2004

Print



Duplicate



Main
Menu



COMMENT

Drawing Reference:

START WITH PAGE NUMBER FIRST FOLLOWED BY SECTION OR
DETAIL REFERENCE. Example: A-1, Detail 4

Specification Reference:

PROVIDE SPECIFICATION SECTION AND PARAGRAPH IF APPLICABLE.
Example: 02070 1.5.D.2 (Page 02070-2)

Comment:

The Comment and Compliance Review package for the C-0 Occupancy looks good. One point you might want to make in the mechanical description of the 55F ECW system is that CHW temperature will be controlled through the HX to keep above the room dewpoint (by 3F-5F?) to preclude condensation in the electronics racks.

RESPONSE

Project Contact Response:

Agree and will incorporate comments

Comment:



Fermilab

FESS/Engineering

Please ensure that your review included a review of the project for appropriateness of the proposed systems, impacts on existing systems and operations and specific technical requirements to be incorporated into the design

PLEASE ENTER THE FOLLOWING INFORMATION

Reviewer:

Teri Dykhuis

Project Number

6-8-3

UIP ECP (If applicable)

Project Phase:

Comment and Compliance

Comment Date:

February 13, 2004

Print



Duplicate



Main
Menu



COMMENT

Drawing Reference:

START WITH PAGE NUMBER FIRST FOLLOWED BY SECTION OR
DETAIL REFERENCE. Example: A-1, Detail 4

Specification Reference:

PROVIDE SPECIFICATION SECTION AND PARAGRAPH IF APPLICABLE.
Example: 02070 1.5.D.2 (Page 02070-2)

Comment:

I don't have any comments on this project.
Teri

RESPONSE

Project Contact Response:

Thank You for Reviewing this Project

Comment:



Fermilab

FESS/Engineering

Please ensure that your review included a review of the project for appropriateness of the proposed systems, impacts on existing systems and operations and specific technical requirements to be incorporated into the design

PLEASE ENTER THE FOLLOWING INFORMATION

Reviewer:

Tony Kanyok

Project Number

6-8-3

UIP ECP (If applicable)

Project Phase:

Comment and Compliance

Comment Date:

February 6, 2004

Print



Duplicate



Main
Menu



COMMENT

Drawing Reference:

START WITH PAGE NUMBER FIRST FOLLOWED BY SECTION OR
DETAIL REFERENCE. Example: A-1, Detail 4

Specification Reference:

PROVIDE SPECIFICATION SECTION AND PARAGRAPH IF APPLICABLE.
Example: 02070 1.5.D.2 (Page 02070-2)

Comment:

No comments

RESPONSE

Project Contact Response:

Thank You for Reviewing this Project

Comment: